EVALUATION REPORT OF THE TEACHING AND LEARNING WITH DIGITAL VIDEO ASSETS PILOT 2003–2004

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About Becta

Becta is the Government's key partner in the strategic development and delivery of its information and communications technology (ICT) and e-learning strategy for schools and the learning and skills sectors.

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Introduction

Teaching and Learning with Digital Video Assets 2003–2004

In 2003 Becta commissioned the University of Hull to undertake an evaluation of the Teaching and Learning with Digital Video Assets Project. This publication reports on the findings from this evaluation.

The Teaching and Learning with Digital Video Assets Project was unique in that it sought to 'Investigate the potential of broadband connectivity to facilitate and promote the integration of digital video assets into subject teaching and learning'.

The Project investigated:

- how teachers and learners exploit digitally authored video assets to enhance learning and attainment
- how the use of the technology affected learning and attitudes to learning
- teachers' and pupils' experiences of rich-media resources for learning
- the implications for the provision and management of the assets in schools.

The Teaching and Learning with Digital Video Assets Project (2003–2004) differed markedly from the Becta Digital Video Pilot Project 2001–2002 because it sought to explore the impact of digitally authored digital assets on teaching and learning in curriculum subjects and across the broader curriculum. Additionally, it investigated the various issues arising from the distribution and hosting of digital assets across a broadband connection. This was reflected in the resources provided for the schools (see Appendix D) and digital media assets produced by schools.

The digital media assets included video clips, audio files and still images that could be downloaded by teachers in school and which were designed to:

- enable teachers and learners to exploit digitally authored video assets in order to enhance learning and raise attainment
- encourage teachers to include digital assets in their everyday teaching through the use of appropriate technical support and pedagogical training
- encourage pupils to use the digital assets to enhance their subject work
- encourage teachers and pupils to submit their work to a secure online portal, and promote discussion and analysis of these shared resources
- explore the place of digital resources within the National Curriculum
- investigate issues for content management and storage of digital content at school level.

In relation to the aims stated above, this report considers the impact of digital video and the use of digital video assets thematically, as follows:

Theme 1: Impact of digital video assets and digital media assets on teaching

Theme 2: Impact of digital video assets and digital media assets on learning, pupil performance, attainment and social skills

Theme 3: Impact of digital video assets and digital media assets on school management leadership and organisation

Theme 4: Use, management, distribution and storage of digital media assets and related technical issues

The success of the project was dependent on the collaboration and co-operation of various private and public sector partners. These were principally the Regional Broadband Consortia (RBCs), the Department for Education and Skills (DfES) and Becta. Hardware and software providers and several content publishers (see Appendix E) made their materials available for schools participating in the project through a portal provided by the East of England Regional Broadband Consortium (E2BN).

Executive summary, key findings and recommendations

The Teaching and Learning with Digital Video Assets Project was an ambitious undertaking that sought to extend the boundaries of using content in the form of digital media assets in teaching and learning. The project was multi-layered and multi-faceted, in that it combined several interconnected objectives operating at different levels.

It involved creating digital video assets (both original and repurposed) and downloading ready-made digital media assets using an online portal. These two distinct types of assets could be used either discretely or combined to use as resources for teaching and learning.

Fifty schools were selected to take part in this second pilot project from across two separate Regional Broadband Consortia (RBC). These were the East of England Regional Broadband Consortium (E2BN) and the South West Grid for Learning (SWGfL). For the evaluation of the project, all the participating schools were asked to complete online questionnaires at the start and end of the period. A representative sample of 12 schools from across each RBC were visited in the first phase of the project, and a subsequent selection of six schools formed the basis of the case study reports described in this report. The case study schools were visited on a number of separate occasions by the evaluation team.

The infrastructure which supported the project ranged from RBCs through LEAs to participating schools. Schools were expected to integrate (in most cases unfamiliar) Apple Macintosh computers into their ICT infrastructure and manage the downloading, uploading and storage of digital video assets. Teachers needed to learn to film and edit effectively using digital video. For most teachers involved in the project, using the Apple Macintosh computer and iMovie video editing software was also a new experience. Additionally, they were required to take on board the concept of downloading assets from the project portal to use in their teaching. This demanded a significant degree of conceptual understanding, reflective practice and risk-taking on the part of the participants.

Because the focus of this project, and hence this evaluation report, seeks to establish the factors that come into play when digital video and digital video assets are used in teaching and learning, the project differs markedly from the Becta Digital Video Pilot Project 2001–2002, whose primary focus was on film-making and the language and grammar of film. Becta has already disseminated practical advice resulting from the current project (Becta, Digital Alchemy, CD-ROM 2004), and it is expected that many more schools will greatly benefit from this advice. Within most of the participating schools themselves, the project has gathered enough momentum to become self-sustaining, but it is still at an ‘adoptive’ stage of development, and the concept requires further monitoring over a timescale sufficiently extended to be able to measure any long-term impact on the schools.

The project has been successful in meeting its stated aims, in that it clearly highlighted the issues that need to be taken into account for the future development and use of digital media assets at a local (school), regional (LEA/RBC) and at a national (policymaking) level. There are also a number of issues relating to distribution and use of assets that content providers will need to consider.

The project has been extremely well received by all the project schools, and the teachers involved were grateful for having been given the opportunity to participate. Many felt that the project had made a substantial and lasting impact on their schools:

> *“This is an extremely worthwhile and welcome initiative. It has definitely had a positive impact on pupils at this school; I only regret the frustration of time and curricular constraints. Pupils feel empowered with the use of technology of this nature: it prepares them for life in a media-saturated world in a very direct way. It makes them critically aware and develops analytical skill. I feel very fortunate to have been involved.”*

"Many thanks for providing us with this wonderful opportunity. We will continue to use our equipment and I am fully confident that the use of digital video assets will enhance both teaching and learning across the curriculum."

The quality of work, the innovative approaches, and the substantial body of work (digital video assets) created in the schools deserves the attention of a wider audience.

Key findings

Theme 1: Teaching with digital assets

1. Teachers use digital media assets in a variety of innovative ways and at different stages in their lessons. The assets are utilised throughout all stages of the lessons.

2. Teachers are very resourceful in creating their own digital assets for use in lessons. The majority of assets used in teaching were produced by the teachers themselves and were mostly created using digital video. This may be related to the desire to customise the resources they use for teaching. This has significant implications in terms of time management and the place of digital resources provided for teachers to use. Teachers report spending more time preparing lessons than is usual when digital assets are used. This may be due to the fact that they include time spent producing the digital asset itself and are not describing just the time spent on planning and preparing for the lesson. It is likely that lesson preparation time would reduce as teachers become more experienced in the use of digital media.

3. Evidence from the project indicates that digital media assets are most commonly used in art, ICT, English and science. This is the case in both primary and secondary schools. History and geography departments also make considerable use of the assets.

4. Repurposing of digital video assets downloaded from the portal and elsewhere is still relatively rare. Teachers are just beginning to understand the concept of repurposing existing assets and will need further assistance and support to embed this as part of their normal practice.

5. Teachers do not use digital media assets simply because they motivate or occupy children more. They use the assets and the associated hardware for a wide variety of reasons, and are able to articulate their reasons for selecting and using a particular digital media asset in a lesson. This relates the use of digital media with specific lesson and learning objectives.

6. Digital assets are used to support and extend existing teaching strategies and methodologies. It is less common to observe teachers using the digital assets to teach in new or innovative ways. Therefore, the full potential of digital media assets in the classroom has yet to be exploited.

7. Careful use of the assets by teachers can bring about learning and understanding which would not be possible, or as simple, using conventional resources and technology. This is especially the case in situations where teachers are faced with difficult concepts and ideas which pupils typically misunderstand. In these circumstances appropriate use of digital media assets was often shown to clarify pupils' misunderstanding and assist in deeper comprehension.

8. Teachers need to be flexible in the way they organise their classrooms when digital video assets are employed. Greater flexibility is more evident in primary schools than secondary schools. This is linked to the nature of the timetable in secondary schools, which is frequently cited as a factor inhibiting the use of digital video assets.

9. The use of additional technologies such as interactive whiteboards can add an extra dimension when teachers are using digital video for whole-class teaching. However, teachers are not yet fully aware of the entire range of possibilities that interactive whiteboard software offers them to enhance their use of the assets.

Theme 2: Impact on learning

1. Although the use of digital video and digital video editing in schools is highly motivational, this does not in itself provide sufficient reason for using it. Pupils may be highly motivated when they are involved in these activities without learning anything of real value. Therefore, the use of digital video and digital video editing must be linked to added learning gains above and beyond what would have been achieved without the technology. There is evidence to link the use of digital video and digital video editing to improved conceptual understanding in many subject areas.

2. When pupils author with digital media assets, there is evidence to show that learning gains are transferred into other subject areas. This can result in attainment gains in certain areas. These gains are most noticeable in the area of literacy, where there appears to be an improvement in writing and speaking skills.

3. Pupils become more critical and discriminatory in their selection of assets as they learn to use digital video and digital video editing. This may bring benefits that are transferable to other areas of the curriculum under certain circumstances and conditions.

4. Digital video and digital video editing suits many learning styles. Auditory, visual and kinaesthetic learning styles are catered for by the multi-faceted nature of the medium itself. Digital video enables learners to access information and assimilate it using auditory and visual stimulation. The addition of digital video editing enables kinaesthetic learners to demonstrate their understanding by the physical processes involved in handling the hardware and software. Teachers and learners were very aware of the potential offered by digital video for engaging a wide range of different learning styles and frequently commented on these benefits in the feedback to the evaluation team.

5. Digital video offers many opportunities for assessment. Used as a tool for self-assessment (assessment for learning) it can enable pupils to dramatically improve their performance. It is important that teachers consider carefully how they gather and record evidence of the processes involved, and any subsequent learning achievements, when pupils author with digital video. This could take a number of different forms.

6. Pupils respond better to assets that have been produced by their peers than by professional organisations. They also respond well to resources produced by their teachers. The language and ‘slickness’ of some professional assets is a demotivating factor for some pupils.

Theme 3: Leadership, management and school organisation

1. The support and encouragement of the headteacher and senior management team was seen to be a vital ingredient in all the schools where the project was deemed to be most effective.

2. In schools where the headteacher and senior management team were explicit sponsors of the project, they had a clear and well articulated vision of how it would enhance the learning experience of pupils in the school. This vision was shared with the entire staff of the school and was reflected throughout the school.

3. In schools where the headteacher and senior management team were explicit sponsors of the project, the initiative was often spread beyond the individual lead teacher and steps were taken to embed and sustain the initiative as part of the wider fabric of school life.

4. Schools are beginning to think carefully about the roles and responsibilities of staff involved in projects such as this. In some cases they are using teaching assistants very creatively to support the work of teachers and learners. In other cases they are beginning to explore completely new roles, including employing learning technologists to ensure that the use of digital video in the curriculum is sustainable and widespread. Consideration of issues such as this is essential if schools are committed to using digital media as a teaching and learning tool throughout the curriculum.

5. The use of teaching assistants and other adults in these activities requires additional managerial skills on the part of the teacher. Their traditional role is likely to change as more non-teaching staff are deployed in schools. Many teachers have not been trained to manage other adults in this way, and need support and assistance if they are to handle this new role effectively.

6. The rigidity of most school timetables, especially in the secondary phase, can be a barrier to the effective use of digital video and digital media assets by teachers, and in lessons where pupils author with digital assets. This was less evident in primary schools, where the timetable was more flexible and subject boundaries are more permeable. Some schools are, however, developing an awareness of these barriers and in some cases they have started to experiment with radical alternatives.

7. Within the project a number of schools have invested in more equipment to extend its scope. Some have decided to implement the PC equivalent of iMovie and maximise the resources they already have, while others have decided to buy more Apple equipment for this particular purpose (even though they have not previously used Apple equipment). It is encouraging to note that only a few of the teachers had any serious reservations regarding the technical platform they were using in the project.

8. Continuing professional development (CPD) was an essential component for the schools in the project. Many different models were developed by the project schools to enable other teachers to become more involved. These ranged from traditional Inset programmes or Inset days to individual peer mentoring. Evidence suggests that the peer-mentoring model has had the greatest impact in terms of long-term sustainability.

Theme 4: Use, management and distribution of digital assets and related technical issues

1. Establishing the use of a portal or online repository where teachers can access digital media assets is a groundbreaking concept. To take full advantage of the opportunities offered by such a portal, schools require more professional development that includes experiential learning covering both the pedagogical and technical aspects of this technology.

2. Regional Broadband Consortia (RBCs) have demonstrated their capacity and capability to provide digital media assets and learning content. In some cases they have proved eager to develop initiatives within their region, both within, and beyond the project.

3. Projects such as this require close co-operation between RBCs, LEAs and their schools. All parties need a clear understanding of their roles and responsibilities if the project is to be successful. Sometimes this was not the case, causing schools to experience delays and technical difficulties.

4. There have been problems associated with the use of the project's online portal partly related to the lack of broadband connectivity in some schools. Even at the end of the project, not all participating schools had access to a broadband connection, which impaired their involvement in the project.

5. Establishing a robust and usable portal for the project proved problematic and was delayed from April 2003 until September 2003. This had a negative impacted on the overall development and aims of the project, especially those relating to the downloading, uploading and use of digital video assets.

6. Not all the resources appeared on the portal as originally intended, for the following reasons:

   - The quality of materials provided was not good enough.
   - Some content providers failed to meet deadlines.
   - There were problems with copyright and fair use.

   These factors affected the choice of digital media assets available to participants, some of whom found them inappropriate for their needs.

7. It is important that educational content providers, including publicly funded bodies, consult policymakers, educational institutions and education professionals to address issues of file and delivery format, fair educational use and copyright.

8. Factors affecting the teachers' usage of the portal include:

   - issues associated with a perceived lack of time to investigate the portal
   - the usability of the search tools on the portal
   - technical issues within a school's own ICT infrastructure
   - technical issues relating to the use of the edge caching systems
   - lack of broadband connectivity in a few schools
   - problems associated with downloading materials from the portal (eg, blocking of certain file formats).

   The last four points relate to factors that are external to the ICT infrastructure in schools.

9. Although there have been problems with PC/Apple Mac integration (such as networking the Apple computer on a PC network), these have not been a significant barrier to the progress of the project itself and its stated aims and objectives. Most of the teachers involved have had little problem using the Apple equipment supplied, and many have expressed a willingness to explore it further.

10. The use of QuickTime Pro, which enables cross-platform media development using Apple and PC computers, has not been fully exploited in this project. It remains a very powerful cross-platform tool that enables the repurposing and conversion of a wide range of different assets. Teachers in the project are now reaching the stage where they would benefit from further support in the use of this resource.

11. The benefits of using and repurposing existing digital media assets by teachers and learners has yet to be fully realised. Teachers are just beginning to conceptualise what this involves and how to undertake it on a technical level. Further help and support are needed to enable them to recognise the wider pedagogical benefits of undertaking this type of activity.

12. Despite the availability of an online forum and the portal itself, there was little inter-school activity and sharing was minimal. However, teachers are generally very positive about the benefits of co-operation and sharing, as was demonstrated when they met at the Apple Teachers' Institute (ATI) in April 2003.

Recommendations

1. Teaching and learning with digital media and digital video assets is enhanced significantly when there is full senior management support, on both a strategic and pedagogical level. This support must be present in order to make the use of digital video assets successful and sustainable.

2. The effective use of digital media and digital video assets is considerably enhanced by the appropriate use and management of teaching assistants and other adults in a collaborative teaching and learning situation. The circumstances under which additional classroom support of this kind works best vary from school to school, according to how they conceive the role of teaching assistants and other adults. In circumstances where it was seen to be most effective, teaching assistants had received both technical and pedagogical training and support to enable them to undertake this new role. It is recommended that schools give due consideration to their workforce strategies for the future.

3. Digital video and digital video assets must be firmly embedded in curriculum activities and schemes of work in order to justify themselves and their subsequent demand on teachers' time. This embedding will also need to filter through to examination syllabuses.

4. Working with digital media assets suits a flexible and adaptable school infrastructure in order to enable good practice to take hold. This includes timetabling issues, effective use of the school day and classroom organisation. It is recommended that schools consider flexibility and timetabling issues when planning the use of digital media assets.

5. As more high-quality educational materials become available for downloading and sharing, it is essential that RBC, LEA and school restrictions on internet traffic are carefully analysed and relaxed, while not ignoring internet safety and computer security.

6. Content providers should be encouraged to provide digital media assets in formats that can be repurposed and contextualised by teachers and children. It is important that digital video assets should not be confused with 'passive' teaching by 'digital television'.

7. Educational digital media assets and digital video assets should be available from a range of recommended portals and repositories. Teachers and pupils should have the opportunity to contribute to and share these assets.

8. Where it is not already the case, the use of eLearning Credits should be considered in relation to digital media assets.

9. There appear to be significant learning and social gains when pupils act as peer mentors for other children during activities involving the use of digital media. Further investigation and research is recommended to explore the significance of this in greater detail.

10. Pupils respond more positively and engage more readily with assets that have been produced by their peers or teachers. This contrasts markedly with the use of more 'professional' digital assets. The significance of these findings should be explored further.

11. Any future project as broad in scope and innovative as the Teaching and Learning with Digital Video Assets Project needs to be broken into clearly defined discrete stages and provide opportunities for participants to meet on a face-to-face basis as well as online. Timescales need to be carefully considered.

12. When working with digital media assets it is important that there is sufficient help and advice for schools in the nature of digital media, its acquisition, authoring and contexts for use. In addition, schools need more help and advice on organising their files and data on a network (a media-on-demand system, for example).

13. The evidence suggests that teachers, schools and LEAs have the greatest success working with digital media assets when they retain an open mind towards cross-platform and multi-platform technological developments and issues. This raises significant issues about technical support and continuing professional development (CPD) for teachers that should be discussed further.

14. Schools, LEAs and policy makers should consider the potential of DVD authoring to give pupils greater ownership in the learning process and to enable wider access to resources at home.

15. It is advisable that schools consider how they will gather and record evidence of the processes of digital video editing and the creating of digital video assets, not just the outcomes. Without appropriate evidence of the process (and this itself could be in digital format), it is difficult for external bodies such as Ofsted to award credit where it is due.

16. Policy makers, advisory and statutory bodies, including QCA, examination boards and Ofsted, need to be fully conversant with the nature of digital media assets and how their use might affect the future of teaching and learning.

17. Schools, policy makers, advisory and statutory bodies, including QCA, examination boards and Ofsted, should consider the use of digital portfolios, and online records of achievement for both formative and summative assessment.

18. Digital video equipment and software are becoming more readily available in the home and school than ever before. The cost of this equipment is falling dramatically, and many pupils have easier access to such facilities outside school. As with ICT equipment in general, schools should be aware of the uses pupils are making of digital media technologies at home and outside school. This will eventually have implications in school in terms of differentiation and progression for pupils who are already familiar with the basic principles of digital video editing. Concurrent learning of this nature requires much greater investigation and research.

19. The momentum gained from the Teaching and Learning with Digital Video Assets Project should be maintained and developed further in participating schools on a focus basis.

Research design and methodology

Research design

The underpinning research design for this evaluation is based around the concept of 'realistic evaluation' (Pawson and Tilly, 1997). This research approach seeks to avoid the extremes of both qualitative and quantitative research methodologies. It is therefore a mixed method research design. Pawson and Tilly contend that many evaluation studies are 'black box' research approaches, in that they identify the outcomes and results of a particular initiative but leave the mechanisms which brought it about largely undiscovered. For the purposes of this particular evaluation it was not sufficient to identify the outcomes when teachers and pupils work with digital assets. It was also important to identify the mechanism by which these outcomes occurred and in what contexts. This is a fundamental principle behind 'realistic evaluation', which seeks to identify what works well, for whom, and in what contexts.. Rather than trying to establish any absolute principles, 'realistic evaluation' attempts to identify the mechanisms by which a successful initiative or intervention takes place and the contexts in which this occurred. In contrast to many research approaches which seek to identify a causal link to prove the initiative has been successful (or not), realistic evaluation seeks to explore the precise mechanisms and explain why the initiative succeeded (or failed) and within what parameters.

This is a highly appropriate research design for this project, as it gives the policymakers and advisory bodies (DfES and Becta, for example) charged with making recommendations for larger roll-outs of similar projects the opportunity to specify under what conditions and circumstances the roll-out is likely to be effective. Our aim as evaluators has been to identify what has worked well in the use of digital assets and what has worked less well, for whom this applies, and under what circumstances it applies. Given this approach and the many variables involved, we are not seeking to make any universally applicable truths about the impact of using digital assets in teaching and for learning. Rather we have attempted to identify examples of where the initiative appears to have made significant differences (outcomes). In doing so, we have applied the principles of realistic evaluation and identified the factors (mechanisms) that have made this happen and the conditions (contexts) under which it was produced.

Methodology

Owing to the nature of the activity, and in accordance with the research design outlined above, we have adopted a 'mixed economy' approach to data collection and its subsequent analysis. The process of data collection was broken down into two separate phases.

During the first phase (April–July 2003) we were primarily concerned to gain a broad understanding and appreciation of the activity taking place across all the project schools. We therefore identified online questionnaires as an effective means of surveying all the schools involved. This provided both qualitative and quantitative data upon which we could subsequently select a smaller sample for in-depth case studies.

The quantitative data is shown in the accompanying graphs throughout this report. The first questionnaire returned a baseline of participants' experiences and background in using digital media in their teaching. We used this subsequently to select the 12 schools (see below) for the first phase visits. It also informed the general information presented throughout the report, including some of the statistical information we present. In addition to the questionnaire, the research team also attended all the various training events associated with the project and monitored the discussions that took place in the various forums linked to the project.

To conclude the first phase of the evaluation (April–July 2003) we visited 12 schools across the participating Regional Broadband Consortia. The schools were selected on the basis of the initial questionnaire returns. They provided us with what we anticipated would be a

representative initial sample of project schools. Hence, 12 schools were selected which included a representative sample of secondary and primary schools in addition to several special schools (see Appendix F). These visits took place in May and June 2003 just as the project schools were coming to terms with the practical aspects of the project.

In the second phase (September 2003 to March 2004) the evaluation focused on six schools identified for in-depth case studies. These had been selected from the 12 schools visited in the summer term of 2003. Although the original brief from Becta had been for only four case study schools, we elected to undertake six in order to provide the breadth of evidence required. The six were selected for a variety of reasons. In all six we had observed examples of widespread practice in the use of digital video. This extended beyond just one teacher or one department area. On this basis we anticipated there would be an ample selection of lessons and material to observe during our school visits. We also needed to ensure that we observed practices in each phase and therefore selected schools from both the primary and secondary age groups. Additionally, the schools selected were willing participants and agreed to allow us access for further visits and interviews. Contact with the remaining 44 schools in the project was maintained via the online forum which Becta had created for schools, and by our decision to use a second questionnaire in January–February 2004 to provide the latest data. The project manager also visited the remainder of the schools in the sample during the autumn term of 2003, and we were given access to his field notes for further analysis.

Data collection instruments

We collected data using several different methods. These were online questionnaires, interviews (with teachers, pupils, senior management and supporting staff), lesson observations, a review of the digital video assets created during the course of the project, and email interviews with experts working in the field.

In all cases the evidence was recorded using a range of data-collection instruments (see Appendix B) and technologies, including video and audio recording. Where appropriate, interview and observation data was transcribed into written and graphical format for further analysis. After the first set of observations and interviews in the summer of 2003, we modified our interview and observation instruments in the light of experience gained from these initial visits. We adopted a more flexible interview schedule when working with teachers and pupils, in order to allow them more opportunities to detail their own stories and narratives. This gave us a richer set of data because it encouraged participants to talk more freely than a more formal interview format would have allowed.

To set a context and background for the project, we conducted research into the current literature and online resources relating to the use of digital video assets in education.

Data analysis

All evidence collected was analysed by the evaluators in order to identify common themes and ideas. We adopted a themed analysis approach in order to identify and develop a conceptual understanding of how digital assets were being used by teachers and learners, and the impact this was having. All the data was coded according to the themes and concepts which we identified as important during this process. We eventually identified four principal areas of interest and relevance in terms of the brief set by Becta. These were:

- Impact of digital media assets on teaching
- Impact of digital media assets on learning, pupils' performance, attainment and social skills
- Impact of digital media assets on school management, leadership and organisation
- Use, management, distribution and storage of digital media assets.

Theme 1: Impact on teaching

Introduction

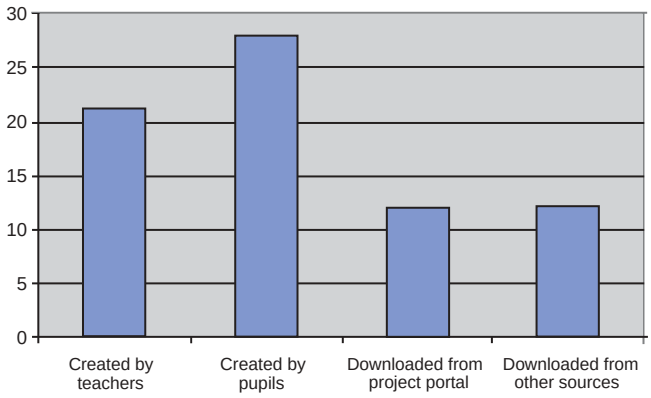
This section of the report illustrates the impact on teaching when digital assets are used in the classroom. Teachers use digital assets in different ways - as part of the starter session, the plenary or, as suggested by the questionnaire evidence, throughout the main part of the lesson. After identifying the different ways in which we saw assets used by teachers, the remainder of this section focuses on how this altered teachers' methodological approaches, and what impact this has had on their teaching strategies. The impact on pupils' learning and understanding when teachers use these assets is examined in greater detail in Theme 2.

Range and scope of digital assets used

Patterns of use

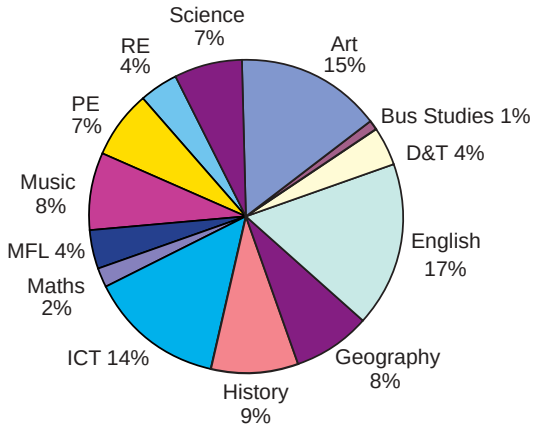
Although the original intention of the project was to provide teachers and pupils with most of the digital assets they might require through a broadband portal, this did not happen in practice, and indeed most of the assets used by teachers and pupils came from elsewhere (as shown in Figure 1). In the majority of cases, teachers and pupils created their own assets by filming or by accessing them from other online resources. Nonetheless, it is worth noting that the vast majority of teachers in the project report used digital assets on a regular basis as part of their lessons (only two out of 43 did not).

Figure 1: Origins of digital assets used in lessons



In the questionnaire evidence, teachers from most areas of the curriculum reported using digital video assets. The highest use was noted in art, ICT and English. This may be explained by the fact that many of the lead teachers were ICT co-ordinators or ICT teachers. Because of the visual nature of the digital video, it is perhaps not surprising that art features strongly, as do English and media studies, owing to the implicit links or relationships between these subjects and film making. However, this is not as rigid as it sounds – within the primary schools digital video assets are being used in an integrated and cross-curricular manner (see Figure 2). We also found that digital video assets are being used in the wider aspects of school life, for example making an information video for parents or the community, or to address issues such as bullying.

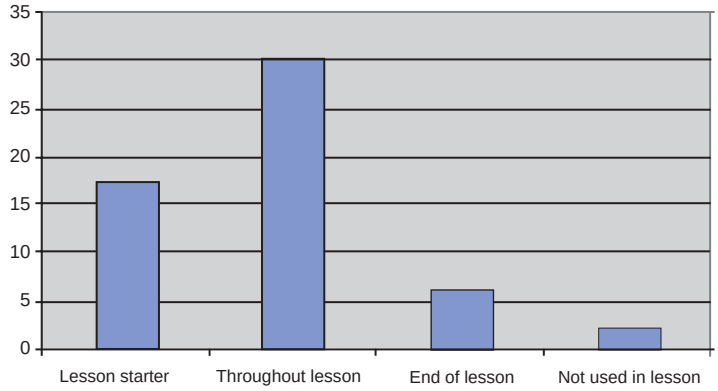
Figure 2: Use of digital video assets in subjects



Use of digital video assets

Teachers use digital assets in a variety of ways during a lesson (Figure 3) depending on their lesson objectives and desired learning outcomes. There is a clear pattern in terms of usage, with the majority of teachers indicating that they would use the asset throughout the lesson either as central to the lesson or to consolidate learning objectives at regular intervals during the lesson. This is evidenced by case study observations, where teachers moved seamlessly between the use of assets for exposition to a practical activity and then back again to the asset. Sometimes only a brief refresher was needed in using the asset. “In art we took pictures of pupils’ faces with different emotions, changed them to black and white and made them into a slideshow – this ran throughout the lesson so the pupils could draw them and then apply different colours depending on the mood.”

Fig.3: When digital assets are used in lessons

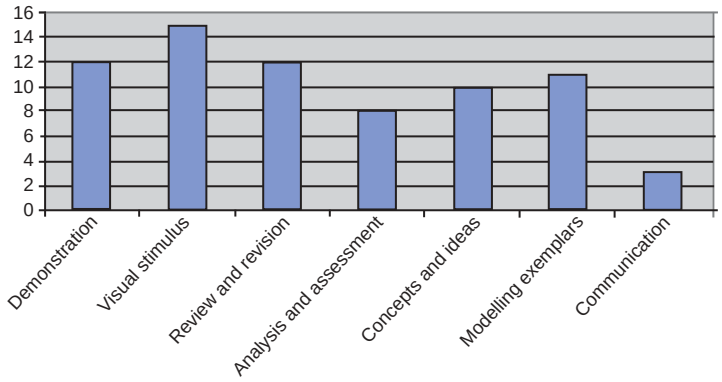


It was found that many teachers were able to articulate their reasons for using a given asset to achieve a learning objective in their subject. It is important to note that this extends beyond the motivational factor of using ICT or digital video assets for their own sake. An example of this was seen in a school where the teacher had elected to use digital video to reinforce pupils’ understanding of adverbs in the literacy strategy. This was achieved by filming Year 4 pupils acting out adverbs to be shown to pupils in Year 6. The resulting digital video asset achieved the teacher’s learning objectives for the Year 4 pupils and her own Year 6 class (see School Case Study 3*)*. In another case study school, the teacher had actually referenced all her digital video activities to the QCA schemes of work for literacy and humanities.

How assets are used

Teachers used digital video assets to support and extend their existing teaching strategies. In addition, they used digital video and digital video editing for recording and analysis to highlight aspects of learning and understanding that would be either impossible or unrealistic to achieve without use of the technology. Figure 4 illustrates the main use of digital asset in lessons (data derived from questionnaire).

Figure 4: How assets are used



Demonstration and illustration

A significant number of teachers in the questionnaire evidence, and in the case study schools, indicated how they used digital media assets to demonstrate or illustrate a specific aspect of the real world.

This was perhaps the most common use of the assets that we were able to observe. It ranged from illustrations of geographical features through to some interesting video clips made by one school to illustrate aspects of a GCSE IT syllabus. Where the teacher was keen to illustrate to pupils the use of digital devices such as control devices in the outside world, he had made his own digital film about traffic lights and barcode readers at supermarkets. This enabled pupils to see for themselves real-world applications of IT. Another school dealt with parking congestion and traffic flow in the local village with reference to a British Pathé News clip of congestion in 1950s London.

Stimulus and inspiration for a subsequent learning activity

Teachers in the project frequently used digital media assets in various combinations as a stimulus for subsequent teaching activity. They talked about the visual and cinematic quality of using high-impact digital assets such as a volcano exploding to stimulate further discussion and thinking by the pupils. In a special school for pupils with severe learning difficulties (SLD), pupils were shown combined still and moving images of spring, while the teachers played an extract from Vivaldi's *Four Seasons*. This media-rich experience helped students relate and contribute to the concept of spring as used in the lesson (see School Case Study 5).

> *"The poem '*The Sea*' was used to demonstrate the visual quality of poetry and how poets use imagery to evoke responses from the reader. Images were filmed during an extension week activity and edited to accompany a reading of the poem by students at a film-making workshop."*

Review and revision

The instantaneous access to information provided by digital video (rewind, fast forward), and the ability to freeze a moving image with absolute precision, encouraged a number of teachers to use digital video assets for review and revision. This was particularly apparent in one school, where the teacher had created his own learning resource relating to two key

scenes in Shakespeare's *Macbeth*. This presented four different film interpretations on a single DVD created using the iDVD software supplied with the equipment. It enabled the teacher to repeat a particular scene, or section of a scene, quickly and accurately, maintaining pupil interest. The pupils themselves commented on the significance of this when they spoke about their frustration in another lesson (science), where the teacher's attempts to cue and replay sections of a VHS analogue video clip cost valuable lesson time.

Analysis and assessment

The use of digital video assets for assessment purposes covered several different approaches, including the recording of pupil performance in dance and PE, which enabled teachers and pupils to analyse and compare it with exemplar and/or professional performances. This allowed pupils to analyse their strengths and weaknesses instantly so that they could improve their performance. Another example of digital video assets used to records pupils' progress and achievements was observed in the SLD school. Staff were committed to the viewpoint that digital video assets provided the most meaningful way of recording achievement, assessing and reviewing progress that the pupils could relate to. It also provided first-hand evidence for parents of the pupils' progress (see School Case Study 5).

Understanding of concepts and ideas

Used judiciously, digital media assets, and digital video clips in particular, were found to assist pupils in their conceptual understanding of ideas. This is dealt with in further detail under Theme 2, but a number of examples at this point illustrate the different ways teachers used the assets in order to help pupils better understand a concept or idea.

Several schools recognised the potential of using digital video assets, created by teachers and pupils, to teach grammar and parts of speech. Concepts such as verbs in French and adverbs in primary literacy lessons, were exemplified by pupils speaking to camera in a variety of amusing and personal styles (see School Case Studies 3 and 6). The use of digital video assets has proved invaluable for teaching the concept of verification of data within the ICT syllabus. One teacher created a narrative which showed the 'dramatic' consequences over time where the key character had not been thorough in the verification of 'critical' data (see School Case Study 6).

Modelling exemplars

Teachers often model a learning process before pupils practise it themselves. In some curriculum areas, such as English, modelling of this type is explicitly required within the National Curriculum. One teacher in the project recognised the benefits obtained from using digital video to model the process of handwriting. The video asset showed only the teacher's hand and the subsequent written strokes. Because all distractions were removed, it enabled a clear focus on the learning – and the anonymity of an 'unknown person' modelling the process was preferred by pupils. Similar assets were seen being used in other subject areas such as art in demonstrating drawing techniques (see School Case Study 4) and in PE/drama for demonstrating physical performance techniques.

Sometimes, an asset was used as the model itself, and the outcome was additionally created in school, as in the following example from Year 3 pupils:

> *"Firstly, the children watched TV weather reports: they compared the weather in Peterborough and London using the BBC webcam; they analysed the style of report writing and wrote their own weather scripts. At the end of the lesson, they performed their script while being filmed with a large map behind them."*

To communicate with parents and the community

Some schools have made their resources available to the community and parents. Examples of this include a school where a film about school uniform was made 'to inform prospective

and transitioning students and their parents about the school's uniform policy', or an SLD school where all students from Year 10 onwards have multimedia progress files and post-16 students also have multimedia IEPs (individual education plans) using digital video filmed in class on a regular, ongoing basis.

Impact on teaching strategies

There is no doubt that digital media assets can be successfully used in all subjects: the evidence in both questionnaire responses and case study visits points towards this. Many innovative and original projects have been undertaken, ranging from a very specific focus such as using a sequence of still images to record movement of the sun by measuring the length and direction of shadows, through to more open-ended projects such as the Second World War themed pieces involving the integration of staged reconstructions of historical events, staged news broadcasts and digital video footage. By introducing the use of digital media assets, teachers are able to extend the scope and quality of a lesson.

There is evidence to show that the use of digital assets by teachers alters their approaches to teaching and to pedagogy in general. It represents a modification of their existing practices to accommodate the use of new digital assets within existing structures. In cases where the resource was used, it tended to fit into the established pattern of classroom teaching. Thus, we observed a significant number of teachers who used the assets as a stimulus at the start of the lesson and sometimes as a plenary. This pattern was dictated by the conventions of the three-part lesson, and few teachers observed broke this convention in any significant way when they used the assets.

A number of teachers who were interviewed or observed did not always appreciate the potential teaching gains that digital media offers over its analogue counterpart. Hence, while we observed considerable activity that involved the use of digital video by teachers, it was less common to observe activity that made explicit use of the features unique to digital video itself (for example, the ability to freeze a specific action or part of a sequence when observing a sequential activity, such as a volcano exploding, or the ability to move from different sections of a longer sequence using the time codes that are a part of digital video). These features are more likely to emerge in classroom practice once teachers have become fully familiar with digital video itself, and the different ways which it can be used in addition to a recording medium for playback.

Impact on lesson planning and preparation

A number of recent reports and studies have pointed to the importance of the planning and preparation process when teachers employ ICT as a tool in their lessons (Cox *et al*., 2004). This applies equally to the use of digital video in lessons. The evidence from the questionnaire does suggest that teachers spend time considering the selection of assets carefully, even if they conclude there are no suitable assets for a particular topic they are teaching. Because of the limited use made of the project portal, it was difficult to gauge their selection criteria, and therefore the following questions need further investigation:

- How much time are teachers prepared to spend looking for suitable assets?
- Do they prefer to use the metadata on a portal or free keyword searches?

Teachers take more time to plan their lessons when they incorporate the use of digital video assets. For example, 31 out of 43 respondents in the final teacher questionnaire felt that using the digital assets in their lessons consumed more planning time than normal. The quotation below summarises the feeling of a significant number of teachers on the project:

> "[Use of digital assets] *needs careful forward planning to ensure that the limited equipment is used by everyone and to avoid dead spots in the lesson."*

This is always likely to be the case with any new initiative, as change takes time and involves a considerable degree of personal investment. It can be surmised that, as teachers become more familiar with the digital video assets and what can be achieved, it is possible that the amount of planning time required will diminish:

> *"It does take more organisation now – but once we have a collection of different movies saved and more staff get involved it will become better and easier."*

While the project was designed to use assets available from the portal, this has not been the primary source for most of the assets used. Many teachers (sometimes with their pupils) have created their own assets, with a subsequent increase in time involved in their creation and editing:

> *"Digital video assets are now a regular part of my lesson content, but the planning, organisation and delivery have had to change a little. Preparing the assets when you create them yourself increases the time spent preparing for a lesson."*

This highlights a significant issue, which will need to be addressed when the principles of using digital assets are shared on a wider basis. Teachers may need to decide whether their priorities are to create content and assets, or to access or commission others to do so. This has implications for staffing, which are discussed further in Themes 3 and 4.

Pace and timing of lessons

Although it is difficult to be precise when judging the pace of lessons, 24 out of the 43 teachers who responded in the second questionnaire felt that the use of the assets affected the pace and timing of their lessons. Some teachers indicated that using digital media assets – for example, chapter headings in a DVD – increases the pace of a lesson, saves time and reduces pupils' frustration (see School Case Study 4).

Classroom organisation

To make effective use of digital assets for whole-class teaching, teachers need to consider the physical organisation and layout of the classroom. Some 16 of the 43 respondents indicated that the use of the assets had encouraged them to re-think their approach to classroom organisation.

The evidence suggests that there is a different degree of flexibility in classroom organisation between primary and secondary schools when using digital video equipment. This seems to be a delineating factor between the primary and secondary schools in the case studies. One can speculate that the length and frequency of a lesson in secondary schools may be a limiting factor when using digital video and similar technologies. In primary schools, both the physical environment and generally less rigid demands of a fixed period timetable offer greater opportunities for using digital video (see also Theme 3).

Both of the primary case study schools demonstrated a high degree of flexibility and inventiveness when it came to using the specific equipment supplied by the project for whole-class teaching. In the secondary schools, by contrast, the timetable was frequently cited as a reason for not using the assets as much as they would have liked. This was even more apparent when it came to pupil use of the assets for authorship (see Theme 2). Both primary schools demonstrated what is possible in terms of classroom organisation even with a limited amount of equipment. In one case, we observed a series of lessons where the eMac was connected to the data projector and used to undertake editing using iMovie involving the whole class. This is distinct from pupil authoring with iMovie, which is examined more fully in Theme 2. In that case, the iMovie interface was used as a vehicle to teach skills such as selection, sequencing, chronology and anachronism to the whole class (see School Case Study 1).

In the other primary school we observed a different set of conditions that enabled the equipment to be used effectively. This involved the willingness to carry the eMac between

classes (although this is not a recommended practice and has inherent dangers), and the need to organise classes carefully in advance to ensure that different groups were employed on different tasks at different times.

The manner in which the teacher approached the issue of classroom organisation and management was also very instructive and illuminating. While the first evaluation correctly pointed out the limitations of using just one computer and camera with a whole class, this has not impeded the teachers in this project as much as might be expected. Since the emphasis of this project was not about film making *per se* but was concerned with creating and repurposing digital media assets for use in different learning contexts, the quantity of equipment has (in most cases) not in itself been a limiting factor and has not deterred teachers.

Integration with other technologies

When teachers used digital assets for whole-class teaching, they invariably used some form of display technology. The only exception we came across involved the work one school pioneered where digital video was used to give immediate feedback to students about their performance in PE. In that case, pupils viewed the feedback on the screen of the camcorder itself or on a connected laptop.

All project schools were provided with a data projector to make this possible. In many schools we visited, teachers had additional access to a fixed data projector and often to an interactive whiteboard that offered distinct and exciting possibilities and an extra dimension to what might be achieved with the assets. However, there was not much evidence of use being made of the interactive features of the board –for example, to control a digital video clip from the front of the class while facing the students, or annotate over digital video assets while presenting. Similarly, the associated software which comes as part of the standard package for most interactive whiteboards (such as the snapshot facility) was not seen to be used. Some teachers mentioned that they did not have the software enabled to make use of the interactive whiteboard with the eMac, although this is readily available. Given the large influx of this technology into schools at this moment, this is an area we would recommend for more advice and support.

Criteria for selecting digital assets

Because the portal has only been available for seven months, it is likely that teachers are still deciding on which criteria constitute an appropriate digital resource, and this is likely to be influenced by many contextual factors unique to every teacher. However, we did detect some initial pointers which are worth sharing with a wider audience at this point. Firstly, teachers appreciated resources – such as a historical clip on coastal flooding – which they could re-purpose with new soundtracks. As one teacher put it, a ‘cleaner’, more appropriate, soundtrack was often all that was needed to make the asset suitable for their pupils. The visual material was often accessible as it stood but the accompanying soundtrack sometimes limited its applicability. The ability to re-edit the sound element is therefore of key importance for teachers.

This was also true of some school-filmed assets, such as a lesson observed where the teacher asked pupils to evaluate their own performance in a previously filmed dance lesson. The original soundtrack included pupils chattering, which detracted from the interpretation they were dancing to. By taking away this distraction and replacing it with a clean music track, pupils could concentrate on their movements rather than any incidental conversations (see School Case Study 3). The ability to edit and/or repurpose the asset helped to focus pupils on the teacher’s learning objectives rather than the background chatter.

Theme 2: Impact on learning

Many commentators have noted the motivational impact of ICT on pupils. This appears to be equally compelling in the case of digital media, judging from the evidence collected in this evaluation. Motivation alone, however, is a necessary but not sufficient factor to justify the use of ICT in teaching and learning. Motivation is not a variable which can be studied in isolation, and therefore this entire section of the report identifies the constituent elements of motivation and what this means in terms of engagement, learning gains and sustainability. For example, why does the use of a digital asset by a teacher introducing a topic on parking congestion in a local village motivate pupils more than a traditional approach, and what are the wider implications in terms of learning?

There is no simple explanation for the motivation factor. Digital assets clearly have the 'wow factor', as one teacher described it. This is especially the case for those pupils usually excluded from the traditional curriculum as highlighted in the first evaluation (Reid *et al*., 2002, pp 6–7). But this is a complex phenomenon and one that requires a longitudinal study to investigate the impact of this approach over a longer period of time. The remainder of this section attempts to unravel the separate strands that collectively make up the impact of digital video on learning.

Digital media assets and understanding

Conceptual understanding

Many of the teachers surveyed commented on the greater degree of understanding and conceptual clarity that pupils gained when shown appropriate digital video clips. Some 37 out of the 44 respondents felt that the use of these assets had contributed to an increased understanding on the part of their students. Many identified a link with what they termed 'deeper thinking' and understanding on the part of students:

> *"There is a clear link between the analytical skills necessary in English and those involved in deconstructing a piece of film, both in terms of technical film language and the messages and values contained within the piece, especially the implicit ideological element."*

A good example of this was observed in one of the primary case study schools, where the teacher had invited elderly people from the local village and filmed them talking about memories of their own childhood. Their conversation included references to the Zeppelins and airships of the 1920s and 1930s. None of the children had any understanding of the concept of an airship, but the teacher was able to use British Pathé news clips, downloaded from the portal, to help them visualise the concept more readily. She subsequently extended the exercise by challenging her pupils to analyse the moving images more closely to understand better the provenance and nature of the images as a historical source. In their role as historians, pupils were able to detect the authenticity of the evidence (which of these films might be made by an amateur and which by a professional, for example) more readily, because of their previous experience of making short films themselves.

The impact of digital assets on understanding appears to work on two levels. First, there is an impact when teachers use digital assets as part of their teaching repertoire (when, for example, illustrating or demonstrating a topic) and, second, there is an impact when pupils are engaged in constructing their own understanding by authoring with digital assets. Many reasons are offered to explain why the use of digital media assets enhances understanding. Some teachers identify the medium itself as being the defining factor, as pupils are very familiar with the visual medium and with the language of film:

> *"They understand the rules and language of TV, video and film – sometimes implicitly – whereas they do not always understand the rules and language of more conventional classroom texts. This brings about a faster engagement with a topic and often a deeper*

understanding of the ideas that an exploration of the written text would not have brought about so quickly."

This heightened understanding of ideas and difficult concepts is especially important for teachers in special schools, where traditional texts, and even still images, are often an incomplete medium for understanding. Two case study schools catering for pupils with a wide range of special educational needs and learning difficulties ranging from moderate to severe were both convinced of the value of using digital media as a means of unlocking understanding:

"Many of our students and pupils cannot read, and even stills photographs can have limited meaning. Digital video provides the most meaningful way of recording achievement, understanding targets etc."

"Digital video particularly improves the learning of SEN children; they are so keen to be taking part that it gives them the motivation to join in with lessons. They also benefit from the pride they feel in producing films."

Development of higher-order thinking skills

Closely linked to greater conceptual understanding is the development of higher-order thinking skills. The first digital video evaluation pointed towards learning gains for students in the area of thinking skills, and particularly with relevance to analytical thinking (Reid *et al*., 2002, p 30). This report supports and extends these findings. There is growing evidence to link the use of digital video with the development of thinking skills, especially since the processes involved in digital video editing encourage and require pupils to make their thinking more explicit:

"It's a tool that supports learning but also stimulates creativity within the classroom … and amongst teachers thinking creatively about how you can get pupils to make their thinking explicit, how you can improve their communication skills, it really lends itself to problem solving and group work – the planning process for filming, the filming itself and the editing."

Pupils soon come to realise that the moving images they see on the television or computer screen are not as simple as they may at first appear. The subtle language of film making and editing, with its unspoken conventions, requires pupils to understand the non-linear process of filming and its subsequent linear reconstruction into a narrative. This is a process that can be taught and developed by pupils of all ages. The actual process of filming and subsequently editing a digital asset encourages pupils to think far more sequentially and logically, and this skill is often transferred to other areas of the curriculum.

In English lessons, for example, a number of teachers (both primary and secondary) identified a link between the analytical thinking required to construct a visual narrative using digital video (decisions about shot, location, cuts, etc) with the analytical thinking required in their own subject area.

"There is a clear link between the analytical skills necessary in English and those involved in deconstructing a piece of film, both in terms of technical film language and the messages and values contained within the piece, especially the implicit ideological elements."

There is a significant degree of transferable learning taking place when pupils work with digital media assets, especially if it involves the process of editing and repurposing. This is most potent when the process has a clear subject focus, such as the example of pupils editing digital media assets to create different historical interpretations of the First World War. But it also seems to work even when the curriculum focus is less obvious. Thus, a number of teachers repeated the assertion that digital video editing skills helped pupils to become more skilful in their curriculum work:

> *"It mirrors the editing process in writing. Drawing these parallels seems to have a positive effect on pupils' drafting and editing of their written work."*

Parallels are also drawn between deduction and inference when exploring digital video texts and other decoding skills which can be beneficial when reading. This is supported by evidence from a school not directly involved in the digital video project itself, where staff from the history department had followed a parallel path in collecting and repurposing existing digital assets. In this case, still images, sound files and short moving video files, were combined to produce a series of different interpretations of the First World War. This work exemplifies the development of higher-order thinking skills such as analysis and interpretation. It required pupils to select and organise the digital assets (provided by the teacher) and work as part of a small group to reassemble them into a short, persuasive film to illustrate a particular interpretation of the Great War. The teacher had selected six interpretations, and each group was required to illustrate a separate interpretation. In discussions with pupils following the project, they appeared to have a much higher comprehension of the subject matter and degree of retention than they would normally have gained. Critically, they had developed their ability to analyse and problem solve, breaking the problem down into its constituent elements before reconstructing it from the available resources.

Critical discrimination

The ability to select information in a thoughtful and critical manner is an essential learning skill for pupils in all subjects. However, a number of teachers complain that pupils can be indiscriminate in their selection of sources and examples. Typically, they search the internet for information with low levels of discrimination – 'grazing' as one expert describes it – and even lower levels of criticality. The process involved in authoring with digital assets encourages pupils to be far more critical and discriminatory in their selection and use of individual assets. This may have transferability into other aspects of their learning.

When using video editing software such as iMovie, pupils often start by littering their films with inappropriate special effects, such as adding the 'fairy dust effect' to an empathetic film about the First World War. This seems to be a natural stage in their learning, and many of the teachers we interviewed felt that their pupils were becoming much more discriminatory in their use of titles, transitions and effects based on a better understanding of the medium. They are also becoming more discriminatory consumers of television and film. This is reflected in both the work pupils produce and their own understanding. For example, even very young pupils (Years 1 and 2) recognised when and when not to use special effects such as sepia or black and white when they wanted to create a reconstruction of an old film.

Digital media assets and learning styles

The first evaluation report raised some interesting questions about the applicability of different learning styles to digital video. It was widely acknowledged by teachers in this project that digital assets engage pupils with a wide variety of different learning styles. This reinforces the hypothesis put forward in the first evaluation linking Gardner's (1993) model of multiple intelligences with the work on digital video. There is clearly a link and benefit for visual learners who are motivated by pictures and images and prefer to express themselves in this medium rather than through traditional 'text'. As one teacher stated*:*

> *"Video holds more meaning than words and pictures alone and holds the students' attention better".*

A number of teachers, and indeed learners, commented on the variety of learning styles which digital media assets enabled them to employ in their own learning, especially where pupils were empowered to author the assets themselves.

> *"These are incontrovertible examples of otherwise disaffected students relating very well to the trust and respect afforded to them in being allowed to use expensive 'cool' equipment."*

A hospital school whose pupils have restricted opportunities for the use of digital video and digital video assets has observed a transformational effect on their learning:

> *"The use of digital video and its immediate applications has enabled the pupils to step outside their rather restricted environment. Through the use of digital video, the pupils demonstrated interest, increased communication skills and confidence levels and … a sense of pride in their achievement."*

> *"A number of the pupils at our unit suffer from depressive illnesses. I have found that for the first time some pupils are communicating with other pupils; they are beginning to write their own scripts. Although this has led to slow progress in editing their work, the discussions and number of pupils contributing ideas has been very worth while. In fact, even if they never finish the video, the actual process will have been extremely valuable."*

Again, there was the theme of engagement for learners who are traditionally excluded from the process of learning: "… particularly … visual, kinaesthetic learners and those who learn by doing rather than talking about it …" Linked to comments about multi-sensory stimulation is the fact that many learners (especially those who claim to be strongly visual) find the short nature of digital video clips extremely satisfying. Unlike traditional video films, short digital assets can be easily replayed and repeated, and they seem to stimulate pupils to concentrate more and stay on task longer. This may have a link to the way many adult learners are choosing to learn software applications using short categorised video clips (see Theme 4).

Impact on attainment

Although the evaluation did not set out explicitly to measure attainment gains as such, there is emerging evidence linking the use of digital media assets in their varied forms to improvements in the overall level of attainment by pupils in the curriculum. Both the case studies and the questionnaires identify gains in children's learning when using digital video, particularly in terms of literacy and communication skills. These are explored in greater detail further in this section, as well as in the case study section itself. In this sense, 'attainment gains' includes those which can be easily quantified (such as improved SAT results) and those which are rather less tangible but nonetheless important (including increased pupil resilience and time spent on task). The relationship between the use of digital video and its impact in terms of tangible learning gains is not an easy one to define, and teachers struggle to be precise about it:

> *"It's difficult to ascertain specific effects on the students' literacy skills, but as I mentioned … the quality of the speaking and listening is certainly raised … they consider the needs of the audience and purposes behind their editing much more explicitly than they would with a written task."*

The fact that text can be combined on screen with still and moving images was another factor highlighted as helping to develop literacy and understanding. In a number of schools visited, teachers had progressed from filming and editing resources themselves, and were actively exploring the gains and learning benefits to be had when pupils were empowered to author digital assets. In most cases, this involved pupils filming and editing their own assets, although in some cases teachers limited pupils to editing and repurposing existing assets. Regardless of the origins of the assets, these teachers were enthusiastic about the gains in attainment their students had made as a result of the process. In one case study school visited, results in the written section of the Key Stage 2 SATs had improved from 25 per cent to 95 per cent over the course of a single academic year (pupils gaining Level 4 or above for the year group). The class teacher was absolutely convinced that this dramatic improvement was directly attributable to the processes involved in teaching with and learning from digital video assets. She was able to articulate very clearly a direct link between the processes of

filming (framing a clear story line, storyboarding and shot composition) and the processes involved in writing. She felt the two were analogous with each other and promoted transferable skills that benefited the pupils when they undertook the SATs (see School Case Study 1). The teacher in the above school was not alone in detecting an analogy between the processes of digital video editing and the writing process itself. Other teachers commented on the positive learning gains made by pupils authoring digital assets. In one school we visited, the lead teacher drew attention to the 'plan, do, review' model of learning which is well established with teachers in the primary curriculum. He pointed out how work with digital media assets mirrored this model, but in a more tangible manner that pupils could readily understand. It had the benefit of engaging all types of learners including visual, auditory and kinaesthetic learners.

Digital media assets and assessment for learning

Some of the most interesting findings beginning to emerge at this stage of the project relate to the use of digital video and digital video editing for assessment, self-assessment and assessment for learning. This includes 'dynamic' (that is, live) use of the digital video, which the first pilot report highlighted as an area for further development and investigation (Reid, *et al*., 2002, p 11). A number of the schools are beginning to experiment with the use of digital video for formative and summative assessment. This typically applies to subjects such as PE, drama and English, in which public examination bodies often require filmed evidence of pupils to support the award of grades. There is nothing particularly innovative in this alone, and these departments have been using analogue video (VHS) to record such achievements for many years. However, where teachers are making use of the instant replay facilities that digital video allows (especially in cases where the teacher had opted to record a performance live into iMovie or some similar editing program), then significant learning takes place. In one school, a netball training session was filmed for GCSE PE. Following the session the girls taking part were required to review their performance along with their peers and a teacher who had undertaken the filming. This was done using the screen facility of the camcorder itself, although it would have been more effective on a larger screen such as a laptop or data projector that all the girls could see. Nonetheless, the girls were able to immediately see their own performance and to identify pointers for development in the subsequent training session. This contrasts with the traditional feedback loop that is available in situations like this, whereby the teacher is the usual point of feedback and pupils have a long gap before they can practise the routine again (see School Case Study 4).

In the example above, pupils benefited from the feedback afforded by the technology itself. Although it was not live, it was available to the pupils on completion of the activity. In another example, the same PE department used digital video projected onto a large screen in the gymnasium to show pupils how to improve their trampoline technique. This was almost instantaneously available for pupils to review their performance and try to improve their technique. The teacher involved was enthusiastic about the benefits this was having on pupils' performance and grades. The pupils were equally enthusiastic, commenting frequently on how this feedback loop was so much more tangible (visual) than verbal feedback from the teacher. If this model is applicable in PE, it can provide similar learning benefits for areas of the curriculum which are less obvious.

At the other end of the age range, a similar process was observed with a Year 1 class, who were evaluating a dance performance that had been recorded. Although this instance lacked the immediacy of the example quoted above, it still enabled the teacher to highlight aspects of the performance with ease and precision, since it had been transferred into a digital video asset which was presented and reviewed by the teacher using a data projector. It enabled these pupils to focus on their own performance and identify strengths and weaknesses. The levels of dialogue and communication were impressive and worthy of further attention. In this same school, pupils were encouraged to develop a more thoughtful and self-critical attitude towards their own work and that of their peers. This was achieved in one class through the use of an analogy the teacher called the 'critical sandwich'. This encouraged pupils to be constructive in identifying an aspect of other children's filming and editing which might be improved, along with a positive comment either side of the criticism (hence the sandwich

analogy). The teacher believed this was scaffolding a technique for appropriate use of constructive criticism by pupils in other aspects of their work (see School Case Study 3).

Improved writing and communication skills

A good deal of the evidence collected highlights links between the use of digital media assets and the development of writing skills. One teacher talked about the process of making films as giving pupils 'a model for critical writing', while others referred to the parallels between creating and planning a filmed asset and the writing process, as illustrated in the following quote:

> *"The editing process has a direct parallel to the editing process in writing. Drawing these parallels seems to have a positive effect on pupils' drafting and editing of their written work. Parallels are also drawn between deduction and inference when exploring DV texts and other decoding skills, which can be beneficial when reading. It made the pupils consider and redraft their scripts. They also considered the use of language for dialogue carefully in the 'bullying' scripts."*

The potential of digital video to reinforce communication and writing skills was a theme that recurred throughout the schools:

> *"*[digital video] *can reinforce learning through key words on screen. … Planning and structuring how to get a simple message across to an audience – such as expressing a concept in several short, simple sentences rather than a 20-minute rambling description."*

The motivational aspect of digital video in encouraging children to write was also flagged in many of the project schools:

> *"With my … lower ability Year 5 English group – a real motivator in terms of getting children writing, planning, thinking and creating."*

Speaking and listening

One of the major benefits that emerged when using digital video assets and digital video editing was the development of communication skills. Teachers consciously encourage purposeful talk as part of the literacy strategy and in many subject areas. There were significantly higher levels of purposeful talk and communication within the groups and classes we observed when digital video editing activity was taking place:

> *"If you listen to the children when they are working, the dialogue between them is amazing. Children who don't really expect to be working at the highest level … the chat between them, the suggestions they are making are right out of the top drawer …"*

And when asked to explain this phenomenon:

> *"It's because they are zoned right in on the job … it's another tool, it's exciting and it's different. It provides a permanent record of their progress … they can see how well they are doing but also they can share in the success of a group as well."*

These gains appear to be transferable beyond digital video editing activities alone:

> *"It's difficult to ascertain specific effects on the students' literacy skills, but as I mentioned … the quality of the speaking and listening is certainly raised … they consider the needs of the audience and purposes behind their editing much more explicitly than they would with a written task …"*

Another effect observed in pupils was their attention to detail during digital video editing and their willingness to spend a great deal of time refining and reviewing, then refining again to get effects just right, or ensure that sound effect timings were perfect. Teachers commented on how this was more noticeable in digital video editing than, say, their willingness to redraft a piece of written work. However, this refining and attention to detail in the use of DV creation

and editing did help pupils to be more discriminatory and precise in their selection of words and language. This has particular relevance for the development of writing skills, helping pupils to become more precise in their writing.

> *"Even using a digital still camera had a dramatic effect on how they saw their own story, because you know what they are like ... they sort of meander on and on and on. But when they saw it on film and saw the results they knew what they had and they immediately thought, 'Oh no! Cut that bit out ... cut that bit out'. But of course, in literacy that is exactly what you should do. You have to get a short story, which is the difficult part for children, storyboarded as effectively as a short film."*

There is evidence already quoted to demonstrate a strong link between the use of digital video editing and writing skills. However, it also appears likely that there is a connection with reading skills. A number of teachers commented on the improved level of reading, especially amongst boys, which takes places in the classroom when digital video editing is employed:

> *"It challenges him … in a way that ordinary class would not. He's done more research too. He is reading a whole book called* The Battle of the Blitz *at the moment … and he certainly would not have read it if we had not started this. A big thick book … it's encouraged a lot of them. A lot of them have started reading books about the war."*

A similar example was witnessed in one of the secondary schools where the lead teacher (an English specialist) was helping pupils to film and edit a cross-curricular glossary of words. In the example observed, pupils were set to identify mathematical terms which they could see in the environment of the school (such as parallel lines in a corridor, hexagonal shapes in a car wheel). It was felt pupils would have a greater affinity with a visual glossary such as this than with a written one.

Recording the process

Attention needs to be drawn to the processes involved when pupils author digital assets. There are considerable learning and social gains to be made by pupils when they are involved in this type of activity, but while the product is usually available for examination if required, the evidence of learning and social gains is often ephemeral. One school reported that Ofsted had commented on the 'rather thin' nature of history exercise books during the term when this particular group had been working with digital assets. However, the teachers had suspended the digital video assets activities while the Ofsted inspection was in progress. Without alternative forms of evidence to show what pupils had been involved in doing, the inspectors were not in a position to see the benefits and gains of practical work using digital video assets. However, this was not the case in another school using digital video assets while undergoing an Ofsted inspection:

> *"During Ofsted, in literacy the pupils wrote simple instructions – 'How to make a hat' (links to art).They then produced storyboards for each instruction and videoed it, edited the clips, adding titles and music. This was highlighted in the Ofsted report as 'outstanding practice'."*

This suggests that it is advisable to record evidence of the processes when pupils work with digital assets, and this could be achieved in several different ways. One way might be to keep multimedia records (digital still images or even short video clips) that can be annotated by pupils during the course of their project work. This would have the combined benefit of recording the process for external parties such as parents or Ofsted, and encouraging reflection and self-evaluation on the part of the pupils themselves.

Electronic portfolios

Two of the case study schools were using electronic portfolios to record students' achievements. These included a wide variety of different documents and evidence in various digital formats. In one particular case – a special school for pupils with severe learning

difficulties (SLD) – the digital video assets project enabled them to accelerate their journey towards this goal in a number of unexpected and original ways.

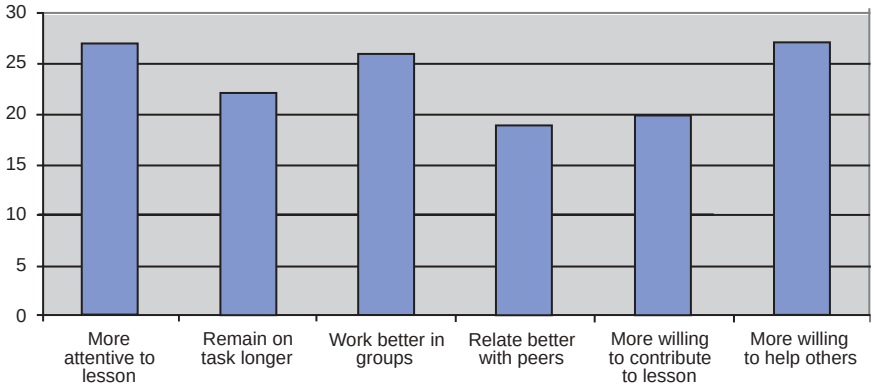
This particular school developed the use of digital video and sound to produce electronic portfolios of pupils' work using PowerPoint presentations. These were used by the school to help pupils work towards their individual educational plans (IEP). This enabled pupils' parents and staff to review progress in a way that provided first-hand evidence in a medium to which the pupils could relate. Electronic portfolios were also used in a secondary school PE department as video evidence for collating pupils' achievements over a period of time, with the additional benefit of providing benchmarks for internal assessment purposes (see School Case Study 4).

Impact on social skills and learning

Most schools responding to the questionnaire noted improvements in pupils' social and interpersonal skills when digital video and digital video assets were used (see Figure 5). Pupils were reported as being more attentive and involved in lessons. Although this may be attributed to the lure of the technology, the responses suggest that it would lead to a deeper involvement with learning.

> *"Most of the pupils are interested in the technology, and this will encourage them to look at subjects, topics, from other points of view."*

Figure 5: The impact of DV assets on pupils' social and interpersonal skills



Collaboration

As reported in the first evaluation (Reid *et a*l., 2002, p 3) there are many significant examples of pupil collaboration and co-operation when they are involved in the processes of producing digital video, and even more so when they are editing it. This appears to be more than an incidental by-product of the process. There are substantial learning gains being made by pupils when they work collaboratively with technology in this way which contrast with the commonly observed use of ICT where pupils work individually at a single computer screen. While there is still a place for individual work in the digital video editing process, and some learners may prefer this style, we were struck by the incidence of high-quality group work taking place when pupils were empowered to author assets collaboratively.

The emphasis on collaboration and group work (in part dictated by availability of equipment provided by the project) has probably had more beneficial effects than teachers might have expected at the start of the project. Pupils working in groups of 3 to 4 (which featured regularly in observed lessons) were required to develop a wider range of sharing skills and they seemed to develop these more as the project progressed. The pupils also learned how to work better with their peers and offer constructive criticism. This was a point one of the teachers made very forcibly, as she had been able to compare the progress her group had made with another group of pupils who had not previously used digital video assets:

"There were eight children in the class last year who are still with the class this year because they were the older Year 5s. The difference at the beginning of the year between them and the rest of the class was enormous because they were so used to working co-operatively together and they really gelled and were used to working … they are very good with the younger ones … and it has generally cascaded down to the rest of the class …"

Pupil autonomy, independence and ownership

In a number of the schools visited and in the questionnaire evidence, attention was drawn to the high levels of independence and autonomy pupils were afforded as part of the project. This was especially apparent in the primary schools, a contrast dealt with in further detail in Theme 3. A number of the schools had very clear, well articulated, policies about the development of pupil autonomy and independent learning. In the two primary schools we visited, both headteachers made explicit reference to their school values and principles, which placed the development of pupil autonomy high on their list of priorities. This was one of the main reasons these schools had elected to join the project, as they both believed the use of digital video by pupils was a powerful vehicle for the development of their school values within and beyond the school curriculum (see School Case Study 3).

This was frequently observed during visits to the schools. Pupils were given varying degrees of independence and responsibility through the digital video assets project. In one school, the headteacher had encouraged the project teacher to recruit a cohort of experienced film-makers.

"Independence of learning, children taking control of what they are doing and having the satisfaction of a really quality end product, has been a really significant factor …"

It was also noticeable how this trusting culture within the school began to have beneficial effects on pupils' personal development. One girl interviewed demonstrated clear leadership skills within her group and was prepared to act as the spokesperson for the group when interviewed. This same girl had been identified by the headteacher as an under-achieving pupil prior to the project:

"If [she] *looks animated and is telling you about all of things she has done, she doesn't normally do that – she doesn't take charge of what she is doing in school. She has always come to school with a notion of 'I find reading a bit difficult, I am not very good at numbers' … so I look worried when teachers ask me those kind of things…' She doesn't look worried on your film, does she?"*

Ownership

Linked to the sense of greater pupil autonomy and independence is the idea of ownership, or what one teacher called the 'democratisation of the media'. The use of digital media in formats such as DVD begins to offer pupils a stronger voice in the selection of the media they see in class and how it is controlled. Many teachers in this project saw independence and pupil ownership as offering significant and lasting gains. This can be measured in several different instances, one such where a lead teacher moved to a new school during the course of the project. Although her replacement was both keen and enthusiastic to progress with the project, she needed technical help and assistance, which was actually provided by the pupils, thus demonstrating their levels of maturity and autonomy.

Additionally, there is an interesting theme emerging which links improved pupil understanding and motivation with assets created in schools, rather than those available commercially. Other teachers and pupils involved in the project commented on the additional value brought about by using assets which the pupils had authored. Despite the lack of 'polish' associated with professional resources, pupils seem to prefer to see their peers making the presentations rather than some remote and unknown professional actor. One teacher tried to rationalise this by explaining how the pupils were able to communicate in language other children understood

better. Their assets avoided the verbosity often associated by pupils with professional documentaries. In his own words:

> *"It's very simple – there is no fluff* (referring here to a film the pupils had made about the Aztecs)*, and then you can get the children to put the 'fluff' back in if you want to …"*

This seems to be a very important theme with considerable implications for teachers and the producers of professional digital media. Paradoxically, the basic and unsophisticated quality of many school-produced assets seems to be their strength:

> *"Part of the brilliance of* [the children's own work] *is that it is rough, unlike professionally produced work, and you can say* [to pupils] *how could we improve that? So they are evaluating the film which they don't tend to do with a BBC film because it's too 'posh'. So the poor quality of the work is part of its strength in a way."*

Theme 3: Leadership, management and school organisation

Strategic leadership and vision

In schools where digital video was seen to have a significant impact on teaching and learning, there was explicit support and encouragement from the headteacher and senior management team. Where the initiative had become embedded in the fabric of the school, there was a clear strategic intent from the headteacher and senior management team to ensure that this happened. The converse is also true, and this reflects much of the research literature into the importance of school leadership. In 20 of the 50 schools the initiative remained isolated, being managed by the individual teacher in charge of the project. This was due to a variety of factors, but the lack of clear support and commitment from senior management was invariably one of these.

The Strategic Leadership of ICT programme (SLICT) run through the National College for School Leadership (NCSL) emphasises the crucial role that headteachers play in identifying a vision for how ICT can affect every aspect of their school. It also helps headteachers to translate this vision into a workable plan that is both embedded and sustained over time. This model is applicable to the use of digital assets throughout a school.

Vision

As part of the data-collection process, the evaluators interviewed the headteacher or senior manager in each school. They were also asked to complete a questionnaire at the start of the project. In the schools where noticeable progress was achieved, the headteacher was able to articulate a compelling vision for how the initiative would enhance teaching, learning and wider school aspirations.

In one school, for example, a newly arrived headteacher greeted the project with considerable enthusiasm because it supported her vision for introducing more creativity in teaching and learning. She saw this as a way in which creativity could be embedded across the curriculum rather than simply in the creative arts sector. This headteacher and her school were working closely with Creative Partnerships to remodel and redesign the school, and the digital video project was central to this undertaking, allowing pupils, and indeed the wider community, to shape their vision for a new school through the medium of the moving image (see School Case Study 1). What characterised schools such as this was their desire to embed the initiative across the life of the school and firmly within the curriculum. It was not, as one head said, left as a ‘bolt on’.

Where does the vision start? In some cases, the vision was brought to the school by the lead teacher subsequent to their initial training at the ATI. In other cases, the headteachers themselves had recognised the potential, even though they may not have had the hands-on skills to undertake the project. This was typified by a primary school case study, where the headteacher admitted that he had no relevant technical skills. However, he was able to make an eloquent defence as to why the school had become involved in the programme and what he believed it added to the overall mix of activities taking place in his school. In addition to simply motivating children, the head had a clear vision for how the use of DV and DV assets would contribute to the larger school goal of developing pupil autonomy and independence. He saw it working alongside several other ICT-related initiatives to help raise aspirations in a school that he described as ‘under-achieving’ (see School Case Study 3).

Workforce remodelling

The use of ICT within the curriculum is likely to be enhanced when support and assistance for the classroom teacher is available. This extends beyond technical support alone. Increasingly, schools and other learning organisations are reassessing the roles and

responsibilities of staff in order to create more efficient and effective models of deployment. This is true for many schools involved in the digital video project and those schools looking to ensure that initiatives such as this are embedded and sustained as part of the mainstream curriculum activity. This section of the report identifies the various strategies which schools have adopted to support the digital video initiative in terms of support staff and their particular roles. It is amplified in the case studies below.

Filming and authoring of digital video assets is a time-consuming activity for teachers. Even in cases where the use of digital video is an integral part of the lesson and learning objectives, teachers are hard pressed to do everything they might wish. As reported in the first evaluation (Reid *et al*., 2002, pp 6-7*)* teachers often make Herculean efforts in order to ensure they can use digital video in their teaching. Digitising analogue VHS tapes or filming pupil performances are particular examples of this. Teachers may well gain valuable skills from doing this work but this use of 'teacher time' is unlikely to be sustainable across the school. Consequently, many schools in the project have identified the need to employ and develop additional support staff to work with teachers and pupils in order to support the technology.

The importance of this development cannot be underestimated. In most of the examples, schools appointed or redeployed teaching assistants in this support role. In two separate instances within the project, schools (secondary) made appointments from the commercial world to act as learning technologists (see School Case Study 2). The remodelling of the workforce schools begs a number of questions:

- What is the role of the teaching assistant, and what are the parameters within which they operate in supporting the use digital video?
- What training and support will teaching assistants need to support teachers and children effectively?
- How do classroom teachers manage their teaching assistants most effectively in this new role?

A definitive answer to each of these questions is outside the scope of this evaluation. The examples below, and the case studies, illustrate possible approaches rather than definitive solutions.

Teaching assistants

Teaching assistants can play a variety of different roles when digital video assets are used in teaching and learning. At one end of the scale, we observed teaching assistants whose role was fairly traditional, in that they supported individuals or small groups of pupils within the normal setting. They had not been trained to use any of the technology or software, and had limited understanding of what the initiative was about. At the other end of the scale, full-time learning technologists were appointed with a brief and job description to support and develop the use of digital video resources throughout the school. This included the production of digitised resources for teachers, support for projects in classrooms, and the organisation and teaching of after-school clubs for pupils. Somewhere in between there are examples of teaching assistants who have received some training and support and are now able to work closely with pupils at all stages of the process.

In other examples, teaching assistants undertook different but equally important roles. In a number of schools, teaching assistants were deployed by the school to support pupils who were editing their own material. This might be in the classroom or in a separate area of the school. This required the teaching assistant to possess considerable technical expertise, which they usually acquired from self-tuition. It also suggests teaching assistants will need at least basic pedagogical knowledge in order to assist pupils most effectively.

The evaluators were able to observe how teachers manage their teaching assistants in this project. Schools now have many more non-teaching support staff and parent volunteers available than ever before. This trend seems set to continue, and indeed accelerate. There

has not been a great deal of training provided for teachers to help them manage these additional support staff. This was evident in many of the project schools where additional support staff, including teaching assistants, were deployed. In the schools where teaching assistants were most effectively utilised, there was a strategic approach to planning and training both for the teaching assistant and the teacher. This amounts to a partnership, and is beginning to blur the traditional distinctions which have existed between the role of the teacher and that of the assistant. Johnson (2004, IPPR) suggests that the deployment of staff in SEN schools, where teachers are actually a minority in the staff, and where they work collectively with nurses, therapist assistants and parents, may provide a model for developing independent learning that is appropriate to a digital curriculum:

> *Special school teachers, like many early years teachers who long ago learned to work with nursery nurses, are confident in the particular skills and knowledge they bring to work with children and are relaxed about staff with other skills making complementary contributions in the classroom.*

Infrastructure

Timetable and allocation of time

Meaningful activities with digital video take a considerable amount of time to complete. When the activity involves pupils and authoring with assets, this takes even longer. Shortage of time within the curriculum is often a critical factor restricting good practice. This is especially pronounced in secondary schools, where the timetable can inhibit flexibility, and rigid subject boundaries reduce the opportunity for genuine cross-curricular activity and deeper learning.

None of the case study schools visited has made any radical change, as yet, to the basic timetable of the school, although some were beginning to consider this. The evaluators are aware of at least one secondary school[1] outside the project, which has opted for a more innovative arrangement whereby the school has a 'flexible day' once a week that allows pupils to work on a specific learning objective all day in a department. Interestingly, this school makes extensive use of digital media, including digital video and internet broadcasting, and runs several digital media courses. Although not yet the norm, this is an approach schools may wish to consider if they intend to embed the use of digital video across the curriculum and within specific subjects.

In primary schools, as in general with the use of ICT, there appears to be less rigidity with timetable conventions, and this has allowed for greater flexibility and experimentation. In both of the primary case study schools, teachers had identified a cross-curricular topic which was already part of their termly planning cycle. They used the time set aside for this topic to incorporate digital video at different levels.

Where is digital video located in the curriculum?

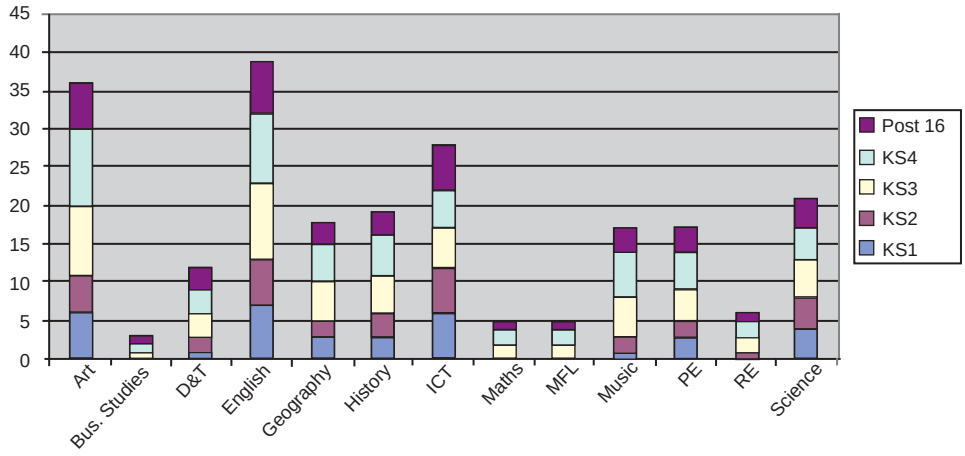
A large proportion (16) of the lead teachers in the project had an ICT background, either as teachers or ICT co-ordinators within their schools. It would not have been surprising, therefore, to find the projects located within the ICT curriculum in many of these schools – but this was not the case. As Figure 7 indicates, use of the digital video project is distributed among a wide cross-section of curriculum areas and key stages and is not used solely to develop ICT. Indeed, only one of our case study schools had located the project within the ICT department, and here it was more widely distributed across the secondary curriculum than in any of the other schools we visited (see School Case Study 6). In terms of encouraging the use of ICT as a tool for learning rather than an end in its own right, these findings are encouraging. The use of digital video seems to encourage teachers to deploy ICT within their own subject areas more readily than other technologies.

[1] Leasowes Community College, Halesowen

Type of resources used/available

Becta provided schools with a standard set of equipment in order for them to undertake the project (Appendix D). While most schools were still using the single camera and eMac provided as part of the original package, a number of schools had recognised the need for supplementary equipment and had purchased another camera (usually the Canon 600i) and extra computers. Some teachers opted to purchase a laptop (an iBook, for example), which offered greater flexibility in terms of location and use than the eMac. Several schools had gone much further and had opted for a complete suite of new equipment on the back of the success of the single eMac. One of the secondary case study schools had used the project to further develop their plans for a digital curriculum. They had equipped an editing and sound lab with 10 eMacs, and were in the process of equipping a new creative suite with another 30 machines (see School Case Study 2). A number of schools had also investigated a PC solution using Pinnacle Studio 8 or Ulead 7 video editing packages to augment the project. Another school in the project had opted for an entirely separate approach and had invested in a quantity of the low-cost 'Digital Blue' digital video camera (see School Case Study 5).

Figure 6: Distribution of subjects by key stage



Continuing professional development (CPD)

As with any initiative, the degree of success the project achieved was directly proportional to the element of support and professional development received by participants. Following the initial training for teachers and technical staff which took place at the start of the project, most of the ongoing professional development occurred in schools and through contact with other project teachers via the digital video forum which was established for this purpose. The ATI training event (see Appendix C) which took place at Cheltenham provided teachers with a good understanding of how to use digital video equipment and how to produce their own assets such as short films and animation sequences. It enabled the project teachers to meet as a group, and start to network informally and offer each other ongoing support throughout the project. Although there was an additional training day that took place in each RBC and focused on technical issues, the area of asset repurposing was never explored in as much detail as may have been necessary. In particular, as noted elsewhere, the use of QuickTime Pro, which is an invaluable and powerful editing tool, was not explored in any great depth. Teachers did receive some training on the use of the package, but this was at an early stage when many of them were still getting to grips with the basics of filming, the language of film and editing. Consequently, teachers in the project were not aware of, or able to make significant use of, the opportunities offered by QuickTime Pro, and they did not repurpose assets to the degree the project might have expected. This is linked to the issues associated with the portal itself and the content provided for repurposing (see Theme 4).

Internally, schools adopted a range of different approaches to broaden the use of digital video to other members of staff beyond the lead teacher. Most of these relied on the enthusiasm and commitment of the lead teachers themselves. In one secondary school the lead teacher

was allocated time and support to work with other teachers in departments which were interested in using digital video. He worked on a personal level to demonstrate the potential of the resources for teaching and learning in subjects across the curriculum. This involved downloading suitable assets from the portal and making them available to staff on the school network in curriculum folders (see School Case Study 6). This approach relies on the individual lead teacher, and requires a considerable amount of dedication and effort to be effective. In the example quoted above, the lead teacher has begun to work outside the school to disseminate good practice to other schools within the LEA. This role is similar to that of the advanced skills teacher (AST), in that it encompasses both in school and outreach activities.

Both of the primary schools in the case studies operated a similar method of training for their staff. The lead teacher was the essential lynchpin in encouraging other members of staff to consider the assets and reflect on their applicability. This often involved 'team teaching', with the lead teacher taking the initiative in planning and delivery of the lesson. As other members of staff became more confident, the lead teacher was able to move more into the background while still maintaining a supportive role. This model of 'coaching and mentoring' seems to have made a significant difference. It is focused and targeted on individual teachers, and provides them with hands-on support at the point of delivery.

By contrast, the traditional mode of whole-staff Inset seems to have had less impact. While there is a place for demonstrating the potential of digital video to an entire staff or faculty, this is only a starting point. Most teachers will not move directly into involvement with a project like this unless there is more focused support, usually in their own classrooms.

There was a consensus between teachers interviewed in the case study schools that face-to-face development or training would have proved invaluable in moving the project forward. Often, the type of support was relatively simple. It is worth noting that the ATI had a significant impact on participants in the project; advice offered from several sources with recommendations relating to good film-making ensured that the quality of filmed assets created by schools was generally of a consistently high standard. This meant that those assets could be used in teaching without 'poor quality' distracting from learning objectives.

It now seems apparent that, had a similar event to the ATI been held to focus specifically on the acquisition, creation and repurposing and management of digital media assets in teaching and learning, that aspect of the project might have progressed at a quicker pace. Having said that, teachers may only derive the optimum benefit from such an initiative when they master the creation of DV assets for teaching and learning using digital video – which they did in a relatively short timescale in this project.

Theme 4: Use, management and distribution of digital assets and related technical issues

Establishing the use of a portal or online repository from which teachers can access digital media assets is a groundbreaking concept. To take full advantage of the opportunities offered by such a portal, schools will require more professional development that should include experiential learning for pedagogical and technical aspects of the technology. This could be summarised as follows:

Pedagogical issues

Understanding the intrinsic properties of digital assets
Using digital video assets in teaching and learning
Criteria for selecting assets from a portal or online repository
Creating effective digital assets
Repurposing assets for use in other learning contexts
Sharing assets within school
Awareness of copyright and fair use issues
Metadata, categorising and searching for assets

Technical issues for teachers

File formats
File size and quality
Viewing digital media
Storage and file management
Editing and repurposing using other applications
Downloading/uploading
Integrating with other learning assets

Technical issues for schools and technical staff in schools

Distribution, management and storage of assets
Whole-school and inter-school strategies
Access and connectivity
Cross-platform communications
Managing and distributing assets
Downloading/uploading

Teachers feel they need extra support and training both in the use of assets and the technical aspects of managing the assets, and this is highlighted by questionnaire responses and case study visits to project schools.

> *"I found there was a lot to learn about everything in the beginning – ie, how to use the camera, edit the film etc, and it was hard to find the time to learn how to use the portal. Now I feel I am up to the point where I would now be able to use the portal because everything else is less daunting. I would welcome the chance to have any further training available so that I can use the assets fully."*

> *"Training staff to use the equipment …* [camera and digital video software] *is a big task. Becoming familiar with the digital video assets available online is an huge ongoing task."*

One teacher hinted at a holistic development in the use of digital media assets in teaching and learning: "There is a need to develop the concepts of e-learning and e-teaching so that they can be embedded fluently in schemes of work." Evidence gathered from the participating

schools suggests that this is a cumulative process and that teachers are now beginning to realise the possibilities inherent within the project, and that they wish to continue using both the portal and assets. Some teachers feel they cannot learn quickly enough: “My worry is that by the time I can use the portal it will no longer be available”.

Regional Broadband Consortium and LEA support and involvement

The project was delivered to schools within two specified Regional Broadband Consortia (RBC). These were the East of England (E2BN) and the South West Grid for Learning (SWGfL). There are 10 RBCs in England, whose functions include optimising and providing broadband services and digital learning resources for schools in their region. The RBCs all include a number of LEAs within their geographical regions. LEAs may have differing policies and technical approaches within their RBC.

East of England (E2BN)

E2BN has been an enthusiastic partner of this project from the outset. It used its RBC infrastructure to recruit interested schools to the project, and was responsible for the selection of a representative sample of schools from each of its member LEAs. The RBC was eager to host the digital video portal through the E2BN website, and brokered links with Digitalbrain, which provided the portal, and HBS (see Appendix E), which was able to provide file encoding, with content management and delivery services between them. E2BN was itself running a content delivery project, and was keen to work closely with Becta to integrate the digital video assets project with this work. The RBC also managed the delivery and installation of edge-caching servers as part of the initiative. Subsequent initiatives by E2BN (such as digital storytelling and using digital video archives) supplemented the project and helped to raise awareness of the use of digital video in the region.

South West Grid for Learning (SWGfL)

The SWGfL is a well organised and tightly administered RBC which was very keen to establish a clear understanding of their role at the start of the project. It approached member LEAs for project participants, and proactively recruited LEA representatives as project associates to support their schools. This had the additional benefit of keeping the RBC up to date with project progress. SWGfL operates a managed service for its portal. The single managed service solution was intended to present a reliable infrastructure for downloading files from the digital video portal. This did not always work out in practice, as high levels of security automatically blocked access to the portal in some schools. On occasions, the site had to be ‘whitelisted’ at the client end to allow access.

The project portal

The online portal developed by Digitalbrain was hosted and encoded by HBS, a contractor to E2BN. This portal was established to provide teachers with access to a range of digital video and rich media assets to download. Not all schools had access to a broadband connection during the course of the project. An edge-caching server box was provided for each school in the project in order to download and store the assets locally in school until required (see Appendix A).

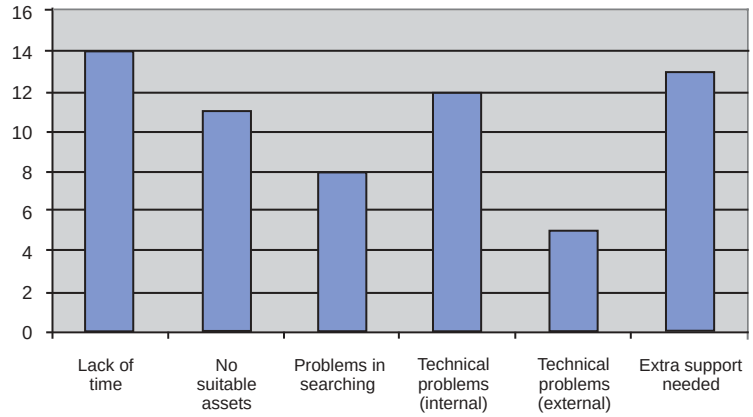
Initially, the portal proved problematic and it was deemed necessary to undertake a subsequent redesign by project management. This meant that the portal was not fully available for schools to use until September 2003. Not all of the originally planned or commissioned content appeared on the portal for the following reasons:

- Some of the proposed contributors failed to submit their resources within the timescale required.
- The quality of some of the materials was not deemed acceptable by project management.

- In the case of one of the UK's national museums, too many restrictions were placed on the use of the materials to guarantee their effective use within the context of the project's aims, albeit that the museum was aware that the users of the material would be a tightly defined educational audience; this suggests there needs to be greater dialogue between public and commercial content providers and educational bodies and policymakers.

Use of the portal

Figure 7: Reasons given for limited use of the project portal



At the time of writing (March 2004), the use of the portal within the project was not as widespread as was originally envisaged within the aims and scope of the project. Answers to the questionnaire indicated a range of reasons for not making as much use of the portal as might have been expected. These are summarised in Figure 7. However, it must be clearly stated that, although teachers were approached in April 2003 and asked to nominate the materials they would like from the British Pathé site, only a small number responded.

Time

Some 14 respondents said that lack of time to search and use the portal was one of the main issues inhibiting its use. We suspect there are several reasons for this: first, in some schools there was still an indication (however slight) that use of digital assets was not seen as fully embedded in teaching, although its potential was recognised. Second, constraints imposed by a (tightly defined) curriculum and inflexible timetable may have been influential.

> *"I have not made the best possible use of the portal due to the time constraints of teaching. This does not detract from its long-term usefulness, relevance and importance."*

> *"This project shows the enormous potential of digital video, and the pitfalls. Simple, easy-to-access assets are the only ones worth having in a busy environment. The value of film-making outweighs the value of the stored films, and has been the most successful part."*

Usability – searching

The portal allows searching under the following terms: *Title, Description, Subject* and *Key Stage*. In both interviews and the questionnaire, teachers made the observation that the portal was not easy to use. Eight teachers commented explicitly that they experienced difficulties carrying out searches. One of the most commonly stated problems was that too many assets were returned on a single search – especially when using *Subject* and *Key Stage* terms.

> *"When searching for specifics, the portal seemed to throw up every asset it had in response, which meant that finding appropriate resources was time consuming."*

Teachers interviewed in case study schools reported that keyword searches using the *Title* or *Description* fields were more productive. Of the 43 teachers responding to the questionnaire, 11 commented that they could not locate content suitable for their subject. This raises issues about the content provided but could be considered from the standpoint that the portal was designed to provide only an example of the possibilities. Some teachers might not be aware of this, and as a result may prove less receptive to the concept of the portal in the future. Some schools were quite specific as to why content was inappropriate for them – for example, in a school for pupils with learning difficulties:

> *"… have used the portal but we have found most of the digital video media on offer is not appropriate to our needs."*

Despite these reservations, the overwhelming majority of the teachers indicated that they wished to carry on using the portal and wanted it to remain available for them to develop its use. Our desk research points towards some effective solutions for accessing and searching online portals (see Appendix A).

Uploading

The other key function of the portal was to enable teachers to upload digital assets that they or their pupils created, to share with other schools in the project. At the time of writing, only a small number of schools have managed this successfully (12 uploaded assets from six schools). Many teachers report having tried but having encountered a host of technical problems at both school and LEA/RBC level. One school found the 5MB limit on files restricting. Despite some initial problems with the portal and a slow uptake, there are some very positive messages ensuing. It is encouraging to note that nearly all teachers (37 out of 43) indicated their willingness to continue to use the portal and the assets (40 out of 43). Several stated explicitly that they wished the portal to remain a resource for them to use after the conclusion of the pilot.

Technical issues relating to the portal

There were a significant amount of technical problems associated with the use of the portal, including:

- storage and file management issues
- file import problems
- file conversion problems associated with downloaded files
- restrictions on file size for uploads (5MB) as specified by the project
- LEA restrictions on uploading to the portal.

Another technical factor in the use of the portal relates to file formats. The MP4 format provided by the digital video portal was confusing for teachers because it requires file conversion before importing into iMovie can be undertaken. This inhibits and confuses reluctant teachers.

Technical issues relating to the portal in school

Some of the technical issues in schools related to lack of broadband connectivity. Some schools only received their broadband connection as recently as November 2003, and some are still awaiting installation. Although edge-caching boxes were in place, these did not always work as effectively as expected (see above). Other schools reported problems with their ICT infrastructure.

> *"The school network is in a bad state, which has given problems when downloading assets. However, I have been able to do this from home and am still able to provide sufficient assets for self and colleagues."*

Each of the member LEAs within the project was responsible for the hardware and service infrastructure through which E2BN contributes. This raised a number of technical issues relating to accessibility: the ISP chosen by some LEAs blocked the download of any files with suffixes such as MPEG, MP3 and MOV, or would not allow streaming video or audio content to reach schools. This issue will become one of increasing importance for LEAs and schools in relation to the increased availability of, and demand for, digital media assets in education.

In one of the smaller primary schools visited, the issue of technical support was raised by the lead teacher and headteacher. This particular school had only limited access to a technician from the LEA. Technical support in small or isolated schools is a significant issue that needs addressing at senior management level. While technical support in secondary schools is usually available on site, technicians are not always able or willing to support Apple equipment:

> *"Many technical issues have arisen – mainly due to our IT technician not being familiar with Mac systems and not being trained to make the necessary changes to our network. In future, much more emphasis needs to be placed upon the technical aspects of setting up the technical side of the project – this has been a major problem for us."*

Cross-platform issues (Apple Macintosh/PC)

In spite of using Apple Macintosh computers over four days on the ATI training course, six teachers indicated that they were less than confident in using the Apple eMac provided as part of the course resources. One teacher described it as 'daunting'. Eight teachers said that their pupils were less than confident using Apple. Taking that into account, only two teachers indicated that they were less than confident filming and editing using the resources provided – even though those skills will have involved quite specific use of an Apple Mac, its OSX operating system and the installed iMovie and iLife software. This suggests that, where there are barriers to cross-platform working, these may be more perceived than real.

In the schools where teachers felt less confident using Apple equipment on their projects, five managed their own projects. Another school had a firm commitment to a specific (PC) platform. Connecting MAC OS to a Windows network for sharing files and accessing the internet is a relatively simple and straightforward task. Guidance and support resources were provided for both the lead teacher and the ICT technician or technical manager on the technical training days organised for the schools by their respective RBCs. In most cases where schools experienced cross-platform difficulties, the project manager usually solved these on his school visits.

With the increasing use of wireless networks, wider cross-platform availability of software and compatibility of data in schools, we recommend that school ICT development policies take an open-minded approach to cross-platform working in order to benefit from technological developments such as the integrated iLife software and the potential of cross-platform editing using QuickTime Pro. As already mentioned in the case of QuickTime Pro, some extra support may have been appropriate for specific aspects of using Apple Macintosh, such as file management and transfer issues and using the iDVD software, the potential of which was realised by a number of teachers.

While some schools have supplemented their Apple equipment with extra purchases of Apple computers (see School Case Study 2) other schools used their existing PCs or purchased extra Windows PC computers, including laptops, to extend their capabilities in the project. Another school felt that providing a more suitable (for their circumstances) and simpler camera (Digital Blue) was more appropriate for most, though not all, of their work with pupils. This decision was one of ease of use and appropriateness rather than a cross-platform issue, except in the sense the camera was not compatible with the eMac. Another school felt that the Digital Blue camera was more appropriate for their very specific needs, although cross-platform use was not the issue.

Training and support

The recommendations made in the Becta DV pilot project and the Becta Digital Video Awards initiative, helped teachers to engage with the film-making processes they used to create assets for teaching and learning.

The potential of QuickTime Pro in schools has not been fully explored in any depth during this project – either for sharing work across networks or authoring. Many schools are not aware of the cross-platform features of QuickTime. Although the initial (ATI) training at the outset of the project did include a session on using QuickTime Pro to create and repurpose digital video assets (which was attended by 17 teachers) and a related session on sharing movies (attended by 10 delegates), this has not evolved in school practice. It could be suggested that this training would have been more effective further into the project. Evidence gathered during the project suggests that this is an area where teachers require extra support and guidance.

The limited use made of the portal, allied with the fact that most schools have used the time to create assets using digital video editing, suggests that teachers are only now reaching the stage where they are in position to make effective use of QuickTime Pro for repurposing assets. Teachers interviewed indicated that they would have liked a refresher course.

The proactive nature of the project manager's support was warmly welcomed in the schools. For example, one teacher's difficulties with creating a DVD was easily resolved within minutes during one school visit. While ATI had a tremendous effect on the motivation and enthusiasm of project participants, a short (one day) 'get together' halfway through the project might have renewed the impetus and enabled participants to share and discuss their work and experience, possibly moving forward the stated aims of the project.

Another type of support that is now becoming widely used in industry and higher education is training using short downloadable video clips. This type of support would allow teachers to 'dip in' to the knowledge/skills they need when necessary. It is an effective form of independent learning. A good commercial example of this comes from Atomic Learning (see Appendix F) which offers tutorials on iMovie, MAC OSX, QuickTime and Windows Movie Maker (eLearning Credits can be used to buy this support). For specific projects it would be possible to develop similar resources in-house by project developers, LEAs or RBCs using affordable and intuitive software.

Email forum – support

The Digital Video Assets Forum, an email-based forum (mail list) was established to enable schools to communicate and offer mutual support during the project. This forum was not heavily used (16 individual contributors posted to the forum between March and May 2004). One teacher indicated that they were reluctant to post in case they 'showed their inexperience or perceived lack of expertise or knowledge'.

DVD

Although the portal was intended as the main method of sharing resources electronically between schools, evidence from the project raised the possibility of using the DVD format for this purpose. Several schools saw the potential of DVD as a positive development in terms of home–school links, and the wider community. At least one school was experimenting with the DVD format as a means of parental involvement with homework. Lack of knowledge of using DVD authoring software has held some teachers back in this respect (see School Case Study 4).

School case studies

Six schools were selected as case study schools for the second phase of the evaluation, which lasted from September 2003 to March 2004. The original six schools included:

- three secondary schools
- two primary schools
- two special schools which worked in partnership.

The schools were selected from the original pool of 50 in order to identify interesting and noteworthy examples of practice. In order to ensure a balance, they were selected from across each RBC and from across phases and types of school. In addition, the schools were identified as potentially interesting case study schools on the basis of the initial questionnaires which teachers completed, and the first round of visits at the start of the project.

Each of the case study schools agreed to be included in Phase 2 in-depth investigations and gave the evaluators access to teachers, pupils and their work. These schools were visited three times during the evaluation. Since many of the themes and details which emerge from these visits are similar, we have opted to provide details of specific features which stand out, in our opinion, as worthy of extra description. For each school we have attempted to identify two such features.

Case study 1: Primary School (E2BN)
Antingham and Southrepps Community Primary School

The school is a small, rural community primary school (4–11) with approximately 134 pupils on roll. The lead teacher for the initiative was interviewed in the autumn term of 2003 before moving on to a new appointment. The project is now being led by a Year 4 class teacher. The school has a mixed intake of pupils drawn from a wide variety of socio-economic backgrounds. It has recently appointed a new headteacher, who is eager to work with community organisations such as Creative Partnerships to improve the fabric of the school and to strengthen the creative activities undertaken by children.

Pupil coaching and mentoring

Digital video was used extensively within the school as part of a deliberate strategy to develop 'digital literacy' across the curriculum. It was used to develop literacy and writing skills and to encourage pupils to be more analytical in their thinking and planning. Pupil coaching and mentoring is a distinctive feature of the work observed. The evaluators observed a series of lessons where pupils worked as coaches and mentors for younger pupils. Usually, this involved Year 6 pupils who were part of the lead teacher's own year class. They had worked on the project for some time and were able to disseminate their knowledge and skills to less experienced pupils. This manifested itself in a variety of ways. In one lesson the Year 6 pupils supported the teacher in much the way teaching assistants might support a teacher. Under the guidance and watchful eye of the teacher, two pupils worked with a small group of Year 1 pupils who were studying the Victorians as part of a QCA topic on toys. The pupil mentors were sufficiently skilled to demonstrate the use of the camera and also to give directorial assistance to younger pupils in terms of framing shots and other filming techniques.

The deliberate use of older pupils in this way appears to have a number of distinct and immediate benefits both for the teacher and for the pupils themselves. The teacher gained additional assistance from these pupil mentors, who were able to speak to other children at an appropriate level. In this school, as elsewhere, the use of digital video is extremely time consuming and labour intensive, and any extra assistance for the teacher is of value. The teacher needed to work with the pupil mentors beforehand in order to prepare them for the work they would be doing and to help them understand what was expected of them in this new role. This is essential in order to avoid uncertainly and confusion on the part of the pupil mentors and the pupils themselves.

Curriculum enhancement with DV assets

One of the most prominent features in this case study school was the overt referencing which had been made to the various QCA schemes of work. Each of the QCA schemes of work made reference to possible resources which might be used to support the topic. In many cases these included video and film resources. This school took the time to cross-reference many of the history and literacy QCA schemes of work to existing or newly created digital video assets. In the case of a history topic on evacuation (a Key Stage 2 topic: Britain since the 1930s), the lead teacher cross-referenced her digital assets to the QCA scheme of work itself and to the QCA scheme of work for IT. This is a largely unexplored area and one where QCA may wish to commission further work.

The use of digital video to support the curriculum was most evident in the case of history topics, though many other subject areas were also seen. In one example, a series of digital video clips showing Victorian toys and modern-day toys (brought in by the pupils) was shown to the Year 1 class through the medium of iMovie itself. The teacher operated the editing software in such a way as to give the younger pupils an opportunity to nominate the clips which they felt would be most appropriate for a movie about Victorian toys. The flexibility of the tool enabled the teacher to place anachronistically incorrect items on the time line and question pupils as to their appropriateness. With careful questioning around the assets ("Are there any clues about its age – look at the …" for example) pupils were able to grasp the concept of anachronism, even though the term itself was not used.

The images of Victorian and modern toys could have been displayed in paper form or even on an overhead projector. The fact that iMovie was used enabled the teacher to make greater use of its inherent flexibility to select and de-select items, thus enabling pupils to concentrate on the underlying historical concept or idea. This seems to be a powerful example of how the technology allows pupils to gain a greater understanding of the concept of anachronism, which is a difficult skill to teach and understand.

The role of teaching assistants

The main report has made a number of references to the important role that can be played by teaching assistants and other adults when digital video is used. Some schools appointed staff with this specific responsibility (see School Case Study 2), while others chose to develop their existing teaching assistants for the role. In this case study, for example, two teaching assistants were given specific responsibility to support the initiative themselves. In one lesson, the teaching assistant was entirely responsible for the setting up of filming equipment and for the hands-on direction of pupils who were filming or acting. The teacher took on the role of director (to use a cinematic analogy), while the teaching assistant was the producer. This division of responsibilities enabled the teacher to focus attention and effort on the aspects of the lesson which were concerned directly with learning, thus maximising his expertise and experience.

In both cases the teaching assistants were acquiring new skills and expertise which allowed them to support both the teacher and the pupils. Although neither had received any formal training in either the software or hardware, they had both developed a sound understanding of the principles involved from the lead teacher. In classroom situations, the teaching assistants were therefore able to work with small groups of pupils (often a pair) to help them to edit their films and to produce more resources. Away from the classroom, they were active in searching the portal and other online resources for further digital assets to support the curriculum activities. In time, they hope to develop additional skills such as digitising analogue tapes for teachers to use in their teaching repertoire.

However, not all the skills required are technical. Equally important are the pedagogical skills and understanding that teachers possess. In the case of the teaching assistants, these skills were also evident. It would have been tempting for the teaching assistants to ‘direct’ the pupils during the filming exercises. Instead they facilitated the pupil’s learning by careful use of prompts and questions rather than direct instructions. This requires a degree of sophistication and skill which exceeds the technical training often delivered on the software/hardware alone.

The success of a project which aims to use and repurpose existing digital assets may well rest upon the number of active participants who are sufficiently skilled and knowledgeable to undertake this kind of work. In this example the school was fully aware of its limited human resources in terms of full-time staff and actively sought alternatives to enable the pupils to enjoy a rich and varied creative experience. The teaching assistants themselves were eager to learn more and report considerable personal achievement in mastering both the software and hardware. Without their expertise and support, it is difficult to envisage the project succeeding in the way it has in this school.

Case Study 2: Specialist Arts College (E2BN)
Icknield Community Arts College

This school, an 11–16 comprehensive school on the edge of Luton with over 1,360 pupils, is a specialist arts college and serves a wide cross-section of the local community. The school is innovative in its ambitions to use digital resources and technology as part of a drive to transform the processes of teaching and learning. The lead teacher for this project is an assistant headteacher at the school and the member of the senior management team charged with the development of the digital curriculum. The DV assets project is one of a number of initiatives currently under way to help reshape the traditional curriculum and learning experiences of students. This is in response to the many national initiatives that focus on learning. The school aims to develop students who are independent learners, and digital media is seen as one part of many whole-school strategies to achieve this.

The school was already well equipped to deliver a digital curriculum, with most core subject areas having access to their own suite of computers. It has access to a 2Mb external broadband connection. Internally, the school network has been upgraded to handle the demands imposed by the use of digital media, and it is anticipated this will lead eventually to the development of a network which can stream video across and beyond the entire site.

The school has an established reputation for digital media work and was nominated for the project by the local RBC (E2BN). During visits, it became evident that the school had plans for the use of digital media which extended beyond the project itself, making it worthy of further study. This case study report focuses on the vision of the senior management team to translate the rhetoric of transformation and workforce remodelling into practice, along with its holistic planning, thinking and resource allocation. Subsequent visits and interviews at the school encouraged us to report in detail, as there were many features other schools might wish to investigate if they are considering similar ventures themselves.

School infrastructure and resourcing

Many schools are aware of the potential digital media offers in terms of transforming the quality of teaching and learning, but few are at the stage of developing a coherent philosophy and strategic plan to translate the potential into reality. This school, however, has taken the first steps down this road by conceiving and implementing a strategic vision for the development of the 'digital curriculum'. The school has adopted what the lead teacher calls the 'Montgomery Strategy', whereby they have decided to front-load their investment by creating a robust infrastructure which will be capable of supporting the use of digital media for many years to come. Rather than adopt a piecemeal approach, the school has decided to implement this vision for the use of digital media across the entire site. All staff have been made aware of the vision, and are required to recognise and plan for the implementation of this in their own teaching areas. The headteacher has issued an unambiguous blueprint to all staff, describing how he sees the future of learning and teaching in the college. This is predicated on the principles of a digital curriculum that the lead teacher has translated into a working development plan for e-learning: "Enabling students to maximise their potential through innovative learning opportunities that exploit digitally based resources, activities and services." The initiative is learner focused, not technology driven. As stated in the School Vision document, it aims to:

> *"Increase the availability, diversity, personalisation and effectiveness of individual student learning, while enabling them to contribute new resources to enhance further learning for others."*

This reveals some of the philosophical and pedagogical thinking behind the initiative. It is essentially a social constructivist approach to learning, which conceptualises technology and software as learning tools for the construction of meaning and understanding. The vision conceptualises the potential of digital resources from the perspective of the learner, and is not couched simply in terms of the production of more resources *per se.* The focus is on transforming the educational process and harnessing the creative forces brought about by

increased pupil autonomy and independence. Thus, the school is talking about the use of digital media as a tool to enable pupils to develop greater understanding and not simply as a resource for more effective teaching or more interesting presentations, important though these are. This level of thinking about the potential of digital media across an entire curriculum is still rare.

At an operational level, the vision has been translated into practice with the creation of the school's own multimedia intranet called the eZone. This is an ambitious undertaking for a school of this size, as it seeks to make available over a wide area network (WAN) all the digital resources that are produced by and for students. This includes a future link with the local City Learning Centre (CLC) to share and develop materials with other schools in and beyond Luton.

In practice, it is still early days and the initiative is still progressing. The school has invested a considerable amount of its own capital resources in the project, and is opening a new modular expressive arts suite in the summer term of 2004. This incorporates two large live performance studios, an e-learning lecture theatre, and a digital editing suite equipped with 30 eMac machines complete with SuperDrives for authoring DVD. The suite also has video-conferencing facilities. Similarly, the school has invested heavily, and in partnership with a commercial sponsor (Canon), to upgrade the existing network in readiness for the use of digital media resources across the site. This includes the installation of a new breed of server called a NASS (network-attached storage servers) for the sole purpose of housing digital video assets. A NASS constitutes a large storage pool shared by many clients, available to all as a network resource. It is the culmination of two concepts: the direct attachment of storage to the network, and the consolidation of storage resources in a powerful intelligent storage system (ISS). It lays the foundation for what is a fundamental departure from the present computer-centric world to a storage-centric architecture that puts data where it belongs: at the centre of the computing environment. Through extremely efficient data accessibility, autonomy and direct connectivity, the NASS helps to break an important barrier, and to put storage (or data) at the centre of the computing environment.

To enable teachers to make more effective use of the digital resources which are being produced, the school is installing data projectors and presentation technologies such as interactive whiteboards across all areas of the school. All of these initiatives will enable the school to make full value and use of the learning resources that the DV project has pioneered.

A significant range of curriculum materials has already been produced as part of the project and will eventually be accessible across the school network as part of the eZone. This is effectively a school intranet which extends to include a vast range of digital materials for curriculum use. The materials cover almost all of the subjects in the secondary curriculum and include examples of:

- teacher-produced documentaries
- modelling examples for pupil use (such as pencil skills for art)
- pupil-produced presentations (eg, mock weather forecasts in geography)
- video records of school field trips (for instance, an art trip to 'Constable Country' around Flatford in Suffolk, and a geography trip to Hastings).

These resources will in turn become repurposed digital assets in the school repository as pupils in future years re-use them as part of their learning.

Professional learning technologists supporting a digital curriculum

The production of digital learning resources is a time-consuming exercise and represents a steep learning curve for the novice user. There are two separate strands of opinion emerging regarding the production of such digital content in schools. Although the majority of teachers in the project reported that lack of time was preventing them from using the portal and creating their own assets, many were still of the opinion it was a worthwhile exercise and one

which teachers needed to engage with. The other school of thought argues that teachers will never have the time required to produce the quality of digital resources they would ideally like. Therefore, it is preferable for teachers to act as commissioning editors, leaving the actual production of digital assets to skilled professionals elsewhere in the school. The scale and scope of this school's ambitions has led the senior management team to opt for the latter arrangement, whereby the school employs a growing team of professional content producers who are able to assist and support teachers in class. This is a somewhat hybrid job role which combines the roles of school technician, teaching assistant and multimedia content producer. As such, it is not the norm in schools and is the reason for describing it more fully for this case study.

The decision was taken to employ a cohort of learning technologists who could be called upon by teachers and students to assist in the development of digital teaching and learning assets. The school now employs two such people and plans to appoint more, as resources allow, in order to establish a core of curriculum technicians and learning technologists to support teaching and learning and drive the digital curriculum forward. The learning technologists' roles are varied but centre on the production of digital video assets for teachers and support for learners, both in class and in the new expressive arts suite. In this sense, the senior management team see the role of teachers as commissioners of content and the learning technologists, along with pupils and teachers, as producers of content. This enables the teachers to concentrate on the use of the resource for learning, and frees them to direct learning technologists to deal with the more time-consuming technical aspects of filming and post-production. One of the learning technologists has accompanied groups of students on field trips. One visit to the cemeteries of the First World War in Belgium was produced purely by pupils who had been trained, prepared, given a clear brief and shown how to edit. The role of the 'e-learning assistants' requires considerable flexibility and a high level of skills that extends beyond the purely technical duties normally associated with the role of school technician. The learning technologist is required to appreciate both the pedagogical intentions of the teacher and the technical possibilities afforded by the technology itself in order to translate their 'commissions' into something both practical and effective.

Interestingly, both of the learning technologists came from a commercial and business background; both had previous experience in the computer industry and had project management skills. Although this was not a deliberate intent, the school felt that it produced many unexpected benefits, and it may look to bring in more people from a similar background. The learning technologists' experience enabled them to learn the skills associated with digital video editing within a short time and to plan for the wider use of the technology throughout the school. Both are now available for teachers to 'book' for in lesson support, and so far they have worked closely with the science and MFL departments. Demand for their services is likely to increase as teachers recognise the benefits of using their skills to support activities such as filming, recording and the production of digital resources for teaching itself.

In addition to producing digital assets for teachers and supporting pupils in class, the learning technologists have a remit for staff development and training. Both have had previous experience in training adults and find this extra remit rewarding, enabling them to utilise the skills they have brought to the school. In terms of their own training, most new technical skills, including those related to using Apple Macintosh, have been acquired on the job. Neither was an experienced Apple Macintosh, user but the equipment presented few problems. They are still developing their technical skills in order to provide the level of service teachers and pupils require.

Pedagogical understanding and awareness is more difficult to acquire. Some of it transfers from the environment they work in: both are perceptive and able to identify elements of the teaching craft which they can adopt in their own spheres of activity. If this model is to provide a blueprint for future learning technologists, it will need to be underpinned with bespoke training programmes and qualifications which are not as yet widely established. As part of the remodelling of the workforce initiative, Becta has commissioned work to identify new responsibilities for technicians (see http://www.becta.org.uk/corporate/extra_out.cfm?id=2943). The focus on learning and the application of new technologies, however, is still

uncommon in terms of qualifications and awards. The Association of Teachers and Lecturers (ATL) is currently piloting a new qualification for learning technologists, and hopes shortly to develop an accreditation pathway. A few universities are developing or piloting innovative programmes, and it is anticipated more will emerge as the need for training and accreditation increases.

The multi-faceted nature of the roles undertaken by the learning technologists at the school offers teachers and pupils many more opportunities to integrate the use of digital media with their curriculum activities. Both technologists can work with small groups of pupils, either in or out of a lesson, providing a level of support and expertise which would not normally be available. They also offer the teacher a project-based approach to the production of high-quality digital materials to support learning. Given enough notice, the learning technologists can identify suitable resources for the teacher to use, or can create them from scratch using the editing and production facilities available within the school. This is an approach which matches the school's vision of a digital curriculum using rich digital media. It may not be a solution for all schools and depends on their particular ambitions and context. However, in this school it is establishing a pattern of use which teachers are beginning to perceive as invaluable. It is another example of the many different ways schools are tackling the issue of workforce remodelling.

Case Study 3: Primary School (SWGfL)
Lanner Community Primary School

The school is a mixed nursery, infant and junior school in a rural village near Redruth. The school falls within an Education Action Zone (EAZ) in Cornwall LEA. The intake of the school is predominantly white, and is drawn from a mixture of private and estate housing. Following the decline of the mining industry in the region, unemployment is considerably higher than the national norm. Despite its rural location, the school experiences many of the problems and challenges facing inner-city schools, including low parental expectations and academic aspirations. The new headteacher has been in post for four terms and has identified serious under-achievement (particularly at Key Stage 2) as a significant issue facing the schools and its community. Enhancing the curriculum and motivating children has therefore been a high priority for the school.

The headteacher felt that the school was ripe for new initiatives that would advance the curriculum, and made a conscious decision to raise the profile of ICT. In order to achieve this, it was decided to move on from a fixed ICT suite and base the ICT infrastructure on a more flexible wireless network to link together the various computers in the school. Four project PCs are fitted with digital video cards in an open area. A number of the rooms have interactive whiteboards, and there are plans to extend this to every classroom as resources allow. (All classrooms are equipped with data projectors and interactive whiteboards.) Teachers can request mobile wireless-enabled laptops when they are needed for whole-class teaching. In addition, the school has access to the project eMac, which is usually sited in an open area and moved to other teaching areas as required.

The school has embraced a pioneering approach to the creation of digital video assets and their distribution throughout the curriculum. This has led to a high degree of pupil autonomy and independent learning in line with the school's aspirations to raise the self-esteem and self-belief of pupils. The DV assets project has been enabled and fully supported by the headteacher: "Independence of learning, children taking control of what they are doing and having the satisfaction of a really quality end product has been a really significant factor …".

Pupil autonomy

It was clear that in this school pupils are trusted to work by themselves for significant parts of the day, and the evaluators often found them in different parts of the building, filming and recording in readiness for the production of digital video assets to support learning. This was part of the school culture and philosophy and not just a chance happening:

> *"I went to see half a dozen children with that* [a video camcorder] *in the hall. In the week before half term I saw different children filming their Tudor presentations. No adults. And every time I went through there, those children were on task …"*

The headteacher saw this as a particularly positive outcome of the project, in keeping with his philosophy of creating opportunities for pupils to grow and develop independence:

> *"The most noticeable impact is how this initiative enables children to take charge of their own learning, and how mature responsible and motivated they become when handling the equipment."*

Equally important was the issue of access and inclusion which digital video brings with it. Although it requires a 'language' of its own, digital video is not overly dependent on high levels of literacy and numeracy *per se*. Therefore, pupils who are traditionally excluded from many aspects of the curriculum find that this is not the case when they are involved with digital video.

The school's philosophy and values were tangible in many different aspects of school life, and very much evident in the digital video project itself. For example, the lead teacher was insistent on asking pupils to reflect on their work, both in terms of the final product and in terms of the processes involved. The use of the 'critical sandwich' exercise was one example

of this. Pupils had been given a formula for offering constructive criticism to their peers. This involved identifying a positive feature about work with areas which could be improved 'sandwiched' on either side. By carefully worded prompting and questioning, the teacher guided the pupils to be far more analytical and self-critical than might be expected for pupils of this age. Indeed, it was evident from the observations and subsequent pupil interviews that they had assimilated the guidance and were becoming much more critical consumers of media both in and out of school. This contributed significantly to the overall ethos of the school in developing a culture of independence and self-reliance.

In one lesson watched by the evaluators, pupils were set a task, in groups of approximately four, to teach older pupils in Year 6 about the structure underlying a Tudor sonnet. This was cross-curricular, in that it was cross-referenced to both literacy and history QCA objectives. The motivational impact of producing a teaching resource for an older year group was powerful and novel, as it is often set the other way around. Pupils were given minimal instructions about the structure of the sonnet and were set to research this before producing and editing their own short film for the older pupils to watch. When interviewed about the project, it was immediately apparent that all the pupils had gained a deep understanding of the Tudor sonnets in terms of their structure and language, in addition to the gains made through the process of producing the resource itself. The group of pupils who had been working on these assets showed a remarkable degree of maturity and self-confidence. They were aware of the benefits to be gained from working as part of a mixed group, and were able to explain how the activity was structured and organised. Leadership roles were distributed by the pupils, and these differed according to the project they were working on. Like most pupils, this group preferred to work in this manner and enjoyed the benefits of undertaking what they saw as a real-life task:

> *"Reading it out of books you just don't get to see how other kids do It … whereas if you are seeing a film you are actually seeing an example of it …"*

Most importantly, the pupils were convinced they were learning more about the topic in this way. Many of them talked about improved memory retention when it came to the structure of a Tudor sonnet. Close observation of the pupils as they edited their film revealed detailed discussions taking place about the suitability of particular clips in relation to the context of the sonnet itself. The focus appeared to be content specific rather than presentation orientated.

The lead teacher was keen to use the resources provided by the project creatively, and together with the children he developed a technique that allows the whiteboard to be used in a similar way to a 'blue screen' mask. By a careful positioning of subject and alignment of the projector, the images appropriate to the asset the children were creating could be projected on the board without shadows, while none of the image was projected on to the pupils themselves. This allowed the children to be filmed speaking to camera. This was observed in their presentation on writing a sonnet when images of Tudor scenes and interiors downloaded from the internet were used. It was found that higher-quality images could be obtained by placing a spotlight in front of the pupil. All this needed careful arrangement and planning in terms of health and safety.

In keeping with the findings from many of the project schools, the lead teacher initially completed all the editing himself. It was not until later that he recognised the potential of the editing process itself and started to liberate the process by getting groups of pupils involved. Pupils now undertake the majority of the editing which takes place and, in so doing, gain many of the benefits described elsewhere in this report. The school now has a clear ethos and culture based on pupils' editing and involvement, with the pupils helping to train and develop new recruits on a rolling basis. This gives the project a feeling of 'permanence' and sustainability in the school. The use of the term 'project' has itself disappeared as the ideals and processes of digital video have become part of the fabric of the school.

Finally, there is the issue of persistence and determination which has been referred to elsewhere in this report . Digital video appears to encourage pupils to edit and re-edit their work in a way which drafting of written texts (even using a word processor) often fails to

achieve. The headteacher in this school feels this is an important and often under-estimated benefit of digital video. He has observed a significant increase in time spent on task when pupils are involved with digital video editing, even when they are largely unsupervised. Pupils want to improve the quality of what they are producing and do not need to be directed to do so, as is often the case.

The lead teacher and head are both confident that the initiative has become embedded in the daily routine of school life and is not seen as an ICT bolt-on. There are ambitious plans to expand the scope of the project and bring in teachers from across the school. The decision to focus on pupils as both the producers and editors of digital assets seems to have been crucial in this school in ensuring that teachers are prepared to move forward with this project. The pupils act as ambassadors for digital video and their enthusiasm for the medium is infectious.

Case Study 4: Secondary School (EB2N)
Clacton County High School

This high school is a large secondary school in Essex that currently enjoys Performing Arts College status. Like many schools built after the war, it is now in need of substantial rebuilding and refurbishment, and this is taking place across the campus. The school is adjacent to the local leisure and sport facilities that it shares with the local community.

The lead teacher is an enthusiastic and resourceful head of a large English department. He attended the initial ATI training in Cheltenham, and was immediately inspired by the possibilities that using digital video within the curriculum could offer. On returning to school, his first impressions were strengthened as he began to undertake work with pupils across the spectrum of different curriculum areas:

> *"It's a tool that supports learning but also stimulates creativity with the classroom … and amongst teachers thinking creatively about how they can get pupils to make their thinking explicit, how you can improve their communication skills, it really lends itself to problem solving and group work – the planning process for filming and the filming itself and the editing"*

In common with many of the lead teachers who took part in this project, he was aware of learning benefits for pupils that extended beyond the use of digital video as an end in itself for filming and media studies. This is evident from the range of different subject teachers within the school who have expressed an interest in becoming involved as the project develops. These include English (the lead teacher's own subject department), PE, mathematics, design and technology, art and geography. Other departments are hoping to join the project shortly. The driving force in this instance remains the lead teacher and, although the school's senior management teams have expressed their strong support, he is at present required to support and assist a wide range of different projects across the school. This includes training and supporting staff as they become familiar with the technology and software, and running several projects with different groups of students. Although the school is well equipped with Windows-based computers and technical support for these is good, there is less clear support for the Apple-based initiative. The lead teacher has been required to undertake a considerable amount of technical work himself in order to achieve some of the aims of the project. There are many examples of different practices occurring within the school, and for the purposes of the case study we have selected two different uses of digital video which merit further analysis.

Digital video used for analysis and assessment in PE

We have commented in the main body of the report on the emerging use and potential of digital video for both formative and summative assessment. The PE department recognised the potential of digital video for both immediate feedback and self-assessment during lessons, and for the collation of electronic assessment folders. These are of interest to a wider audience beyond PE, and seem to offer exemplars that other subjects might adopt.

The PE department had already used analogue video camcorders to capture instances of pupil performance, mainly for examination board assessment purposes. The willingness of the department to take part in the project, combined with support from the lead teacher, enabled the department to build on its previous experience by recognising the unique benefits brought about by the use of DV and DV editing. The department identified three related but distinct uses of digital video for assessment and assessment for learning. These were:

- to support the award of coursework grades based on pupil performance in sports and activities outside school
- to create a set of benchmarks for internal assessment purposes (for example, teacher assessments)
- to enable pupils to undertake immediate reviews of their own performance in order to make immediate improvements.

In each case, the department felt that the use of digital video has added a significant extra ingredient that could not have been achieved through the use of analogue video alone.

Verification for external bodies

Within some subjects, including PE, external awarding bodies require video evidence to verify pupil achievement outside school. This includes a range of activities such as judo, horse riding and dance. Traditionally, the teacher recorded such evidence using analogue video on VHS tape. The use of digital video enables the teacher to edit the material with much greater accuracy and speed in order to produce a more focused record for the examination bodies. In keeping with other developments across the school (see below) this may become part of a digital portfolio (possibly in DVD format) that pupils maintain and develop across the duration of their examination syllabus.

Internal benchmarking with digital video

The creation of an electronic database of benchmark examples offers similar benefits. The PE department is using digital video to record examples of achievement at different levels in order to create a database of video case studies and exemplars that teachers can use to benchmark pupil performance and achievement. Because it is in digital format, the database will enable them to review and search the materials with the additional benefits offered by digital video, as explained elsewhere in the report.

Digital video and assessment for learning

The use of digital video for self-assessment is one of the most interesting applications we observed in this school. Although the PE department used analogue camcorders in the past, with the use of digital video they could explore new opportunities that had not previously been considered. In one observed lesson, the lead teacher used the digital camcorder to record individual pupils as they took part in a netball practice. At the end of the session he was able to use the material to review their performance with them and enable them to identify areas for further development. The impact was forceful and very immediate.

The students involved worked collaboratively to help individual members of the group to identify an area for development that would benefit the entire team. This appeared to epitomise the use of technology as an ‘invisible tool’ to enable learning and engagement. A further development of this principle involves the more immediate benefits gained when the camera is linked to a data projector or through a laptop computer to a large screen. A number of pupils took part in lessons where this technique was used to help them analyse and develop their own performance. One such lesson involved trampoline exercises, which are always difficult for pupils to conceptualise from verbal feedback alone. The use of digital video allowed for immediate and visual feedback, which the pupils recognised as having a distinct advantage over oral feedback from the teacher herself:

> *“When* [the PE teacher] *tells you about trampolining, you don’t really understand what she means because you don’t know what ‘straight arms’ means. You see it on the video and you can see exactly what she means.”*

The comments expressed above are not unique to PE or to this particular school. The evidence in the main body of this report points to significantly higher levels of engagement and understanding by pupils when they can see their own performance live (as in this case) or when the digital material they are watching is produced by pupils rather than outside commercial sources. The lead teacher in this school is of a similar opinion and advocates digital video more generally, as it enables him to contextualise material such as the national strategy videos in English. He is of the opinion that materials such as these need to include examples from pupils at the school, or at least narrations and voice-overs made by teachers. This can easily be achieved with editing DV and digital video assets. This concept is of considerable significance for other subject areas, and for teachers and content providers in general. One can conclude that pupils benefit from the familiarity of the language employed in

such resources, and from recognising the local and therefore familiar actors in the films. This has implications for the production of teaching resources more generally and it may be a fruitful avenue of further investigation beyond the scope of this project.

DVD authoring

A number of schools within the project have experimented with making DVD resources, although at this stage in the project the use of iDVD itself (part of the iLife suite) is still an under-used resource. Many of the schools that have used DVD have done so mainly as a recording and storage medium, since DVD offers significantly larger storage space for digital resources than does CD-ROM. However, some schools are now beginning to recognise the inherent benefits of the format itself, especially for 'non linear' learning. In this case study school the lead teacher spent a considerable amount of time experimenting with the hardware and software itself before starting to develop the use of DVD. Most of this related to issues associated with the digitisation of existing VHS tapes used in the department – for example, key scenes from four versions of Shakespeare's *Macbeth*. In this case, the teacher needed to focus on two crucial scenes of the play that featured in the National Curriculum tests for Year 9. He digitised four different versions of the scenes and created a DVD menu which gave easy access to the required scenes.

The flexibility of the DVD format enables teachers and pupils to review and watch the content at their own pace, both in school and at home. This is significant in terms of better understanding and differentiation. A sample of pupils interviewed during the case study commented on the suitability of DVD for their own learning styles. Whereas traditional analogue VHS tapes are essentially linear in format, DVD is non-linear and allows teachers and pupils to navigate easily between different scenes and different interpretations of the play without the interruptions and frustration associated with using VHS equipment. The teacher admitted that it was sometimes impossible to rewind or replay a section of the VHS tape given the difficulties of finding the precise spot required on each occasion. Hence, ownership of the medium resided with the teacher. DVD changes this, as it enables replays of particular clips and scenes *ad infinitum*. Pupils can ask to see a scene several times over if they need to, ensuring democracy of access. In addition, the use of visual resources used in this manner help pupils to understand the text itself more effectively. While this is not a replacement for the text itself, pupils comment on how the examples of different interpretations offered on the DVD enable them to understand the original text better.

With home ownership of DVD players becoming increasingly common, the school is now considering producing such resources for pupils as part of their GCSE revision materials. Pupils have indicated that they would buy such materials, as these would be a considerable improvement upon the existing revision guides. The lead teacher recognises the potential benefits of using DVD in this manner for a wider range of teaching and learning activities. Studying different advertising genres would be a good example. Again, the ability to compare and contrast different adverts immediately using DVD contrasts with the clumsy mechanisms involved in doing the same thing with video tapes.

With more time and practice, it is possible that schools involved with DVD will start to see it as an appropriate vehicle for pupils to use themselves. The software available is relatively straightforward to use and enables pupils to make presentations in new and exciting formats. The potential for coursework submission is enormous, and we therefore recommend further investigations be undertaken to help schools and teachers use this effectively.

Case Study 5: Special Schools (E2BN)
Watling View, St Albans, and St Luke's, Redbourn

This case study focuses on two special schools for pupils with learning difficulties located in and near St Albans. The project leader works in both of the schools on a part-time basis, thus providing continuity, and some interesting comparisons, between the two project schools.

Watling View is a special school catering for children with severe learning difficulties (SLD) with 88 pupils on roll between the ages of 3 and 19. Some pupils have additional sensory and physical impairments, and a significant number have profound and multiple learning difficulties. During the past few years, a number of pupils with autistic features have been admitted. St Luke's School caters for pupils between the ages of 9 and 16 with moderate learning difficulties (MLD) and has 165 pupils on roll. All pupils have statements of special educational needs, and many have additional needs including behaviour, speech and language, autistic spectrum disorders, and sensory or physical impairments.

Important contributors to the success of this project were the deputy headteacher at St Luke's, who had responsibility for overseeing the project, the keen and motivated teacher who enthusiastically incorporated digital video into his teaching, and an ICT development officer who integrated the work and was responsible for supporting the development of ICT and digital video assets across both schools.

Both schools were involved in early Eastern Region broadband ICT initiative projects and were innovative users of ICT as a means of enabling greater access to the curriculum and the wider world. The schools have received LEA ICT awards recognising their outstanding achievements in the field of video conferencing and digital video and their positive impact on teaching and learning. The key features within the schools that we wish to highlight are how the sustained use of an easy-to-use digital video camera (Digital Blue) can support pupils with learning difficulties, and how this can be used to create innovative electronic portfolios for use by the pupils.

Applied technology

Because of the nature of the pupil learning difficulties in both schools, it was not always appropriate to use the standard Canon camcorder supplied as part of the project equipment. Instead, the schools used a simple digital camcorder (Digital Blue) that allows the capture of between one and four minutes, depending on setting, of AVI files. At Watling View, each classroom has its own Digital Blue camera which pupils and staff (including support workers) can access instantly. Digital Blue is battery powered (not rechargeable), and can also run through a computer USB connection. With these cameras, many pupils can record and film activities in and around the classroom. Support staff and teachers are also able to use this technology to make an instant visual record of any event taking place in the school.

Pupils at St Luke's used the cameras to undertake a local study of their village as part of a geography project. Having undertaken a good deal of necessary preparatory work including scripting, rehearsing and preparing prompt cards, they were taken by minibus to locations in the village where they undertook the filming itself. Staff felt that this heightened their understanding of the subject (the village) by giving them first-hand experience, and then allowing them time to plan and revise before seeing the results of their work on film.

The Digital Blue camera is robust (it is known to have survive being dropped!), and its 'pistol handle' grip allows easy 'point and shoot' filming. This ensures that as many pupils as possible are able to participate in the filming activities. In terms of inclusion this is very significant. Pupils were also able to edit the digital clips using the simple but effective editing software supplied with the camera. The teacher noted that this software, simple though it is, has helped pupils to understand the concept of how films are made and put together.

Both pupils and staff were aware of the limitations on quality imposed by the camera, and used the Canon camera and iMovie software where quality was a higher priority – for example, in a PSHE project on bullying where the aim was to make a video to be shown to younger pupils in the school as teaching material, and for a digital video asset giving a brief introduction to sign language. (It is a school policy to introduce signing as a basic skill for all pupils as there is a hearing impaired unit in school.) Another instance where higher quality video was demanded was in a promotional video 'brochure' on a day in the life of the school which will be distributed to parents on DVD and used in the school reception area to display and demonstrate the work of the school.

At Watling View the Digital Blue cameras were widely used by pupils, with the help of teachers and learning mentors, to record themselves reaching their specific and individual learning targets for each week. The recorded footage is integrated into PowerPoint presentations and played back to the pupils by their support mentors and teachers, or used as evidence for parents at annual reviews. Learning targets might be as simple as ordering a magazine in a newsagent's, but these tasks are considerably demanding for the pupils involved and represent significant milestones in their achievements. The use of digital technology has liberated pupils, allowing them to complete an electronic portfolio without the barriers that written text would create. Indeed, for the majority of the pupils in these schools, a written portfolio of achievement would be entirely inappropriate.

Such is the success of the scheme that a number of other schools and LEAs have visited and are interested in taking on board the ideas themselves.

Development of personal portfolios, profiles and records of achievement

Before the use of digital video, pupils' records of achievement were paper based and most pupils found that difficult to relate to, even when photographic evidence was included. Digital video is now used for recording evidence of achievement, and allows the pupils to make easy reference to their targets in a way that text and even still images would not allow. Indeed, without the moving image this activity would be impossible. The effect is empowering in that pupils can immediately understand and relate to their progress through watching the films.

In the lower school, pupils are set weekly targets related largely to communication with other pupils and adults. In the upper school, the focus shifts to recording targets that relate to life skills such as shopping. In both cases, the use of digital video has added a new dimension to the process. It has opened up new possibilities and is starting to make real inroads into the replacement of paper with digital records. One teacher commented on how the use of live digital video in a drama session allowed the pupils to cement their progress and encouraged them to talk more easily about what they had been doing. This does not normally occur without considerable prompting by the teacher.

> *"... live action means more than a still image. Looking at real life through a window mirrors what they see around them. It holds more meaning than any other form of media."*

As in cases reported elsewhere, the 'immediacy' of the feedback is the key. Because the Digital Blue cameras have no tapes, recordings can be downloaded instantly onto a computer. Pupils like to see themselves on screen, and are often more prepared to take part in this activity than they would in a live performance without a camera. The teachers feel this is due to their exposure to TV images (including CCTV), which makes the entire experience familiar and non-threatening. Pupils are encouraged to try harder and achieve more when they see themselves 'digitally' compared to written targets which have little meaning for them. Interestingly, the same teacher also noted that, while the novelty factor of using digital technology did eventually wane, this was no bad thing as pupils became calmer and less excitable when using it. It became an everyday tool for learning rather than a novelty.

Once the individual's target has been agreed and recorded using the camera, the AVI file is transferred into a PowerPoint presentation both as a means of archiving the target and as a means of presenting it publicly. The quality of these multimedia PowerPoint presentations,

and their impact, is truly profound. They consist of little in the way of text or special effects (so often a distraction when inappropriately used in PowerPoint) and emphasise the impact of the moving image. If pupils are capable of running the presentations themselves, they do so; if not, they are assisted by support teachers. These electronic IEPs (individual education plans) provide a lasting record of how the pupils are progressing and maturing. They engender an intense sense of personal pride and achievement for the pupils which is not normally evident through the written equivalents. The records are used as part of termly and annual reviews that enable pupils, staff and parents/guardians to assess progress and make future plans. Their use in this way warrants further investigation, as it is largely uncharted territory. The teaching assistants used Clicker software to link to the AVI files, making use of its text-to-speech facilities to incorporate more interactivity.

Although paper-based records and files are also kept, these do not have much significance for individual pupils and are maintained primarily as a record for staff and parents. The simplicity of using digital video and its impact on pupil learning and recording warrants further investigation and dissemination. The school involved has recently received an LEA award for innovation in this area and intends to develop the idea further.

Case Study 6: Secondary School (SWGfL)
Plymstock School

This is an 11–18 comprehensive community school in a suburban area of Plymouth. It has a roll of over 1,500 students, including 260 in the sixth form. The local community is predominantly white, and the number of pupils receiving free school meals is less than the national average. The school values achievement, and this is evident through the photographs and press cuttings of pupils' endeavours and achievements in sports, arts, academic pursuits and personal development which greet visitors.

The school has a well developed ICT infrastructure with over 300 Research Machines (RM) networked PCs and up to 50 laptops. There are 15 interactive whiteboards in school, and more are to be introduced shortly. Although the ICT infrastructure is founded on a Windows network, since the inception of the project the school has purchased extra Apple resources to support the creation of digital video assets subsequently made available across the network as QuickTime files.

The senior management has been fully supportive of the project and has allowed the lead teacher the freedom and opportunity to develop his vision for the use of digital video and digital video assets within school. Senior management has also encouraged him to attend conferences and disseminate his work to a wider audience. The school has been highly organised in relation to the project and from the outset has been instrumental in developing a wealth of cross-curricular resources made available across the school network. The lead teacher has initiated a range of support and training initiatives to ensure that the philosophy and aims of the project are clearly understood by the staff. It is these features that are highlighted in the following case study:

Staff training and development

The project lead teacher used to teach ICT within the 11–18 age range and was a school mentor for NOF training, having gained a Leaders' Certificate in internet skills. His experience and vision in the cross-curricular use of ICT proved instrumental in driving the project forward within the school. Although a relatively new teacher (he has four years' experience), he has helped other teachers throughout the school to develop their use of ICT in their subjects. During the initial ATI training, the lead teacher developed his expertise in a range of skills including advanced digital video film-making, animation and web broadcasting. Using iMovie, he created a digital video asset in the form of a sequence of still images set to music – highlighting environmental issues. He used this subsequently as a powerful exemplar with which to inspire staff and pupils at the school.

In order to kick-start the project, he developed sets of resources designed to inform colleagues about the project, including an overview of the project, together with its aims and potential benefits for the school curriculum and the pupils. Another important resource was a highly detailed matrix that offered practical examples of how digital video assets might enhance subject teaching. These resources were available both in printed form and on the school's intranet. From the outset digital video assets were created in school:

> *"… have influenced other staff and stimulated a desire to incorporate their use in teaching. The general willingness of staff to use digital video assets as part of their teaching is spreading."*

To facilitate teachers' confidence in using the resources, the eMac is located in the IT study/office so that teachers can try it out or use it quietly and unobtrusively. It can also be easily moved into a classroom using a trolley. Staff from most departments have demonstrated enthusiasm and started to create their own resources. The project is gaining momentum and can be said to be embedded within the school, which has purchased two extra iBook laptops for whole-school use.

Digital video assets were available from the portal for a range of subjects: for instance, there were materials on Salvador Dali for use in art, and some Pathé news footage of Ghandi's visit to Great Britain in the 1930s was especially exciting to the history department. One of the project leader's successful initiatives was an animation club (currently oversubscribed) which, after an initial induction, pupils use independently. One of the girls has developed her own unique and stylised animation technique using only marker board and pen. She is now seen as playing an integral part of the animation development within the school, and the potential of animation is now being realised by other departments. An unexpected benefit is that the girl's self-esteem and confidence have improved dramatically since becoming involved in the project.

Cross-curricular use of DV assets

Throughout the project the lead teacher, in collaboration with other teachers at the school, has created a substantial repository of DV assets to support teaching and learning within the school. These are currently stored on an external Firewire hard drive at full digital video quality. In order to make these assets available to the school community, they are installed on the school (PC) network in MOV format and can be accessed using QuickTime for subject teaching or revision. Most of these DV assets are relatively short (less than three minutes) and are, in effect, discrete 'learning objects' that can be contextualised further by teachers where appropriate.

The first filmed assets were planned between the lead teacher and other staff who wished to be involved in the project during the initial pilot phase (May–June 2003). Later, in order to increase student involvement, the departments involved selected small groups of students to work on the production and development of materials. It was at this stage that the decision was made to place all the assets on shared areas in the network. After September there was a move to allow staff and pupils to become independent users, taking control of the planning/filming/editing stages to build up department resource libraries, and bring in more departments and involve more of the curriculum. The departments currently involved are art, business studies, English, geography, history, ICT, MFL, RE and science. While the project leader is primarily an ICT specialist, it is interesting to note his personal involvement in working in a completely cross-curricular way that allows the digital video assets to clearly focus on subject content.

Many of the short DV assets created feature the pupils themselves, in the role of either presenter or actor. This clearly links with the evidence from across the project that pupils learn better from their peers. The impact of the digital video assets on learning is reinforced by the use of text in the form of keywords, subtitles or captions – a technique we have seen used successfully in a number of schools. This was especially true for assets that are being use in language teaching. In a sequence created for teaching French, one asset dealt with the verb *avoir* (to have). As the film runs, the viewer (learner) is presented with pupils speaking the verbs; the only image at this point is white text on a black background, and the translation is then repeated with a presenter (pupil) saying the words and other pupils acting parts. Similarly, an asset on counting in Russian comprised simply 10 pupils, each speaking a number between 1 and 10, reinforced by a text caption. This echoed a lesson observed on adverbs in School Case Study 3 or the signing example in School Case Study 5. Other MFL resources were aimed at enhancing the use of French through filmed short plays and dramas. Similarly, a technique that was used in several subjects in the school was dramatic filmed reconstructions of events in history such as 'Queen Elizabeth and the Spanish Armada'. These events were pupils' interpretation of meetings and dialogues that might have taken place during that event. The pupils took on their respective roles with a minimum of props in order to develop their understanding of the events and circumstances.

In one of the observed ICT lessons the teacher showed video clips of IT hardware. Pupils reassembled the clips (using iMovie) into meaningful categorised sequences (input and output devices, for example). Pupils subsequently added sound and captions to these assets creating versatile, bite-sized learning resources. Seizing on the opportunity during the lesson,

one group of students directed and filmed a wireless mouse (belonging to the evaluators) in action to add to their set of assets.

A different example regarding the creation and the use of digital video assets was the filming of still and moving images to provide simulating material that could be used in a number of teaching and learning contexts. For example, a range of assets produced for English consisted of sequences of shots from the natural environment and categorised as 'trees/water'. This 'stock' footage could just as easily be used by other departments. The concept of 'stock' material is of course fundamental to the way that it would be used in commercial and professional contexts outside education. The quality of these resources is as near professional as possible within the limitations of experience and equipment.

Management and distribution of the assets

Once a digital video asset is completed using iMovie, it is archived in DV format on a large external Firewire hard drive, leaving the eMac with enough disk space for editing further projects. A CD-quality version of the asset in QuickTime format is then created and placed on the computer network for all students and teachers to access. The assets are kept in folders within the individual subject area folder structure. Once the creation of DV assets had begun, it soon became necessary to develop practical measures to avoid staff and students overwriting each other's work before transferring it to the computer. Version control became very important, with the introduction of a naming system to indicate the subject, topic and file quality of the assets.

It quickly became clear that pupils and teachers access the assets frequently during lessons and for independent study. The response to the asset library has been positive, and its develops is having a snowball effect, encouraging other staff and departments to join in. The first nine months of the project generated 73GB of assets. The dynamic nature of the project highlighted the need for extra storage space for footage that has yet to be edited – "teachers and students generate film footage faster than they edit it!" – and also created the need for more computers for editing purposes. Final Cut Pro software has been purchased to allow new assets being developed to benefit from the additional tools and features offered by this software. This seems a logical and natural progression.

The teachers and departments involved in the project have not yet started to integrate resources that they have downloaded from the portal with those they have created in school. The lead teacher commented that the project time frame was quite short, considering the ambitious scope and aims of the project, and that they have only 'scratched the surface' of its potential. The school is very keen to work with other schools – mutually sharing resources that would be hugely beneficial in terms of time and effort.

Appendix A: Research overview – digital video assets in education

Introduction

The Evaluation Report of the Becta Digital Video Pilot Project, 2001–2002 (Reid *et al*., 2002, p 79) states that there is "… very little research literature specifically relating to practices of DVE (digital video editing) in schools". The authors attribute this to the limited availability (high cost) of equipment and a general perception that this type of work is of a specialist nature often related to media studies.

While this may to some extent still be the case, the take-up of digital video editing in schools has increased dramatically – this is indicated by both first-hand evidence on school visits, dialogue in publications and presence on the internet. As a result, there is certainly a good deal more current advice relating to the use of digital video and digital video editing in education available for schools. Much of this advice is now available online, and is current and relevant. Two key resources that fulfil these objectives within the UK are:

- Becta's ICT Advice site [http://www.ictadvice.org.uk]
- Digital Video in Education [http://www.dvined.org.uk] hosted by Denbigh ICT Centre, Denbighshire LEA.

Emergence of a digital culture

There are clear indications that an overarching digital culture and literacy are beginning to emerge: many educational and professional organisations have digitised, or are starting to digitise, their collections, either for archival and/or distribution purposes. Many of these organisations are developing archives of digital assets and rich media that can be accessed online from the World Wide Web using a searchable portal. While some of these are restricted to registered users and specialist communities, other organisations (such as the Prelinger Archive at http://www.archive.org/movies/prelinger.php) are making collections of digital assets widely available to an educational and research audience. The motivation of Rick Prelinger, the founder of the archive, has linked this to how, throughout history, knowledge and experience have been lost either by accident or design:

> *"Many early movies were recycled to recover the silver in the film. The Library of Alexandria – an ancient centre of learning containing a copy of every book in the world – was eventually burned to the ground. Even now, at the turn of the 21st Century, no comprehensive archives of television or radio programmes exist."*

At the current rate of growth of digital media assets, one can envisage a bewildering choice similar to that now facing users of the World Wide Web.

Digital tools and a digital lifestyle

Two key forces driving the emergence of a digital culture are:

- low-cost consumer products offering 'near professional' quality
- readily available integrated technologies able to capture, manage, store and edit digital media including video.

For example, the facility now exists for anyone to capture a digital video clip, edit it and upload it automatically to their personal web space, with the accompanying software handling the technical aspects of the upload. It is widely accepted that a great deal of our culture, knowledge, research, history and daily activities and experiences will eventually be digitised. This has profound implications for education. Until recently, children were more likely to come

into contact with computers at school than at home, but the scenario may have shifted fundamentally and anecdotal evidence suggests that they are using computers and related peripherals at home for tasks that are becomingly increasingly sophisticated and may be more multi-layered than those uses and applications of ICT often prescribed at school.

The nature of digital assets

Digital assets do not really exist in the physical sense, and electronic digital data only becomes meaningful when it is physically interpreted using a computer or other digital device and presented in an analogue format. This means that the data (and copies) defining the asset can be stored anywhere and instantaneously accessed from anywhere in the world. It is for this reason that it is always best to keep back-ups in several different ways. The digital format guarantees assets an 'unlimited' physical life. In order for assets to be most flexible and effective for future use, it is best to 'archive' a master copy as close as possible to its original 'raw' format.

Towards a digital culture in education

It is important that education and schools become aware of the emergence of digital working processes and make full use of the opportunities offered by digital media. This is important from both a pedagogical and a technical perspective. In *A Digitally Driven Curriculum* Professor Buckingham argues that there is now a need for a digitally driven curriculum wherein children have to develop critical and analytical skills in order to interpret digital media (Buckingham (ed.), 2001, p 13). In order to enable them to achieve this, he feels that they should be actively involved in producing media. The teachers involved in the project shared this view, pointing out that when repurposing digital video assets and undertaking digital video editing, the deconstructing and re-assembling of the component parts of digital media led to greater understanding on the children's part.

Digital video assets in teaching

Digital video assets fulfil a critical role in teaching and learning. They provide a readily accessible learning object that may or may not be contextualised further as the teacher and/or learner require. They offer cumulative and progressive paths to achieving learning goals. This is enabled by the already stated advantages over traditional analogue methods (linear video), enabling instantaneous access and playback, and the freezing of an instant in time. Learning is also empowered by the ease with which users can edit digital video assets. Although it is perfectly possible to have a 'feature film length' asset, many digital video assets are short 'bite-sized' items of information that are easy to assimilate. It is no coincidence that there is a growth in online computer software training providers that offer this kind of resource (see, for example, Atomic Learning: http://www.atomiclearning.com).

Purchase, availability and use of digital video assets

Downloadable digital media assets including streaming media may be provided free or they may be individually charged or available on a subscription basis. It is worth noting here that when assets are purchased there may be restrictions on how they are used. It should not be assumed that digital media assets need to be, or indeed should be, provided free to schools. Costs might be met as part of an LEA/RBC managed service, the use of Electronic Learning Credits, or of course by the purchase of assets by individual schools (in the same way they might buy books).

Publicly funded initiatives should be able to provide assets in a form that that can be downloaded for teachers and children to repurpose and contextualise for their own needs. Some providers (the BBC, for example) deliver using a streaming format that makes the assets restricted to a one-way delivery, digital educational 'TV'. Interviews with pupils involved

in the project suggest that children prefer learning (and may learn more effectively) when they or their peers are involved with creating and repurposing existing assets.

Ideally, content providers would be able to offer a range of high-quality digital video assets that can be used in such a way. Given the quality of digital video equipment now available, there are unlimited opportunities for teachers, other adults supporting learning and children to create banks of 'stock' digital video assets.

Delivery

There are two main methods for the delivery of digital video assets: streaming and download, which may be either a progressive download (such as QuickTime) where the video starts to play as soon as enough has been loaded, or a cache download where the video asset has to be fully downloaded before it will play. When a digital video asset is streamed, it arrives almost instantaneously. The asset may be either pre-recorded or might be a live broadcast such as a pop concert (live broadcast is generally less common at the moment). As a rule, it is not possible to download and save streaming video to a local hard disk or computer. Both the download options (cache and progressive) allow the digital video assets to be saved to a computer hard drive. The advantages in using streaming for content providers are that they remain in control of the material, its copyright and how it is used. For example, companies delivering (subscription) computer software training can ensure a return on their investment. For the user, streamed media is almost instantaneous, and there are benefits in terms of storage space and bandwidth. The main disadvantage, as stated above, is that it is not possible to repurpose such assets. The three most commonly used players for this type of media are Apple QuickTime, RealPlayer (from Real Networks) and Windows Media Player.

When digital video assets are provided in a downloadable format, the digital video assets can be saved to a hard drive for future viewing and repurposing. In schools, the flexibility and 'plasticity' of this type of asset may prove to have the most value. Some organisations that need to download significant amounts of digital media assets use content delivery management systems. These may have proxy or edge-caching systems to ensure that digital media assets are immediately available and accessible when needed. They may also have software which enables metadata to be associated with individual assets (such as Informedia: http://www.informedia.cs.cmu.edu), making it easier to categorise and search for digital assets, and they may also include filtering and (fair use) software tools. The schools within this project were provided with a range of caching equipment, but the success of this was limited.

Portals for digital video assets

Currently, the delivery of digital video assets is generally through a portal, and much of the research taking place indicates that this will continue to be the case. A portal is basically an online interface that allows a user to locate and access or download assets effectively. The number of portals available is increasing rapidly and they can be categorised as follows:

- Public domain (pd)
- Commercial (buy individual assets from portal) (co)
- Specialist focus (sf)
- Free (fr)
- Subscription (sb)
- Educational (ed)

These are not mutually exclusive categories, and it is more than likely that a given portal will belong to at least two of the above categories. Portals offer the following:

- Indicator of content provided

- Choice of download format and file sizes
- User interface for navigating, searching and retrieving
- Preview thumbnails of images or clips
- Amount of supplementary information relating to the asset
- Comment or review by users
- Upload facilities of the portal (some)

The following examples of portals show the scope, features and techniques available owing to recent developments in technology.

Internet Archive: Moving Image Collection [http://www.archive.org/movies/movies.php] (pb, ed, fr)

The Internet Archive is a public, non-profit body founded to build an 'internet library' to offer permanent access for researchers, historians, and scholars to historical collections that exist in digital format. The moving image element actually links 11 moving image databases ranging from 1,200 'ephemeral' (advertising, educational, industrial and amateur) films in the Prelinger archives, through news footage, to Siggraph 2001 computer animations. Users can search using a text form field or categorised drop-down menu to return a brief description. The pages also offer links to popular and most frequent download categories. Searches provide a brief textual description and, when the asset is selected, a fuller description together with user-rated reviews. Most of the films can be previewed by means of a series of thumbnail still or alternating images, and they can be accessed as streaming video (using QuickTime or RealPlayer) or downloaded in MPEG1, MPEG2, MPEG4, and DivX formats.

People's Archive [http://www.peoplesarchive.com] (ed, sb)

The focus of the People's Archive is narrower than that of the Internet Archive, but it goes deeper, being dedicated to collecting for posterity the stories of the great thinkers and creators of our time. The people featured on the site include biologists, film-makers, physicists and craftsmen, all acknowledged leaders of their fields whose work has influenced and changed our world.

Educational portals

A number of portals that provide digital video assets are specifically targeted at educational users. Some of these are in the higher education sector such as the University of Pittsburgh's Digital Video Project [http://www.education.pitt.edu/digitalvideo/], which provides teachers and student teachers with video clips of examples of good teaching practice.

The development of more portals and online spaces will provide the opportunity for more children to present their work, and for them to review and discuss it among themselves and with peers and mentors. However, for safety reasons the use of online spaces should be restricted to participating and identifiable communities of users.

Below are examples of portals providing access to digital assets which can be used in teaching and learning. Visiting and promoting these within the educational community can only serve to inspire and encourage others to participate and develop this important application of ICT and digital media.

Apple iLife [http://education.apple.com/education/ilife]

This collection of students' work is categorised into subjects and age (following the US education system). Each example of work is linked to teachers' lesson plans and is closely matched and cross-referenced to the appropriate standards for the state in which it was created. The wide range of approaches shown should help inspire teachers everywhere to create their own assets.

City Voices, City Visions [http://www.gse.buffalo.edu/org/cityvoices]

These examples of work by disaffected urban students in Buffalo NY show that using digital video in teaching and learning 'provides a super-tool that can transform urban teaching and have enormous positive effects for poor and minority children in urban schools'. This adds weight to the evidence collected during both this project and the previous Becta digital video pilot.

Becta Creativity in Digital Video Awards [http://www.becta.org.uk/dvawards]

Becta believes that the competition element of these awards helps to raise standards, as exemplified in the winners and runners up for each of the age categories presented on the site. This area also links to advice on using digital video.

iCritique [http://www.icritique.net]

This is a members' online community set up to display digital video work created by students. The site enables peer review and critique, and is searchable by author, genre and producer and school. Importantly, iCritique provides of a safe online space where student have the opportunity to present and critically review work.

New developments in digital video editing

There is a Joint Information Systems Committee (JISC) funded research project developing the implementation of web-based online editing of digital video assets using 'VIDOS' at the University of Oxford [http://www.vidos.ac.uk]. This uses a Java-based management system that allows a user to repurpose a digital video asset using an internet or intranet connection without needing to have video editing software installed on their own computer. Using VIDOS, the user can edit a digital video both spatially and temporally, specifying the desired zoom factor, frame rate and video codec. This work is mirrored by the High Level Skills for Industry (HLSI) [http://www.hlsi.org.uk] project (also funded by JISC), where tools are being developed to allow teachers to convert their word-processed teaching resources automatically into an HTML template, and then combine them with context-free learning objects such as an animation of a petrol engine created using Flash. These objects might have been created by teachers or others but, because they exist 'independently', they allow for the unlimited creation of learning objects or assets.

Managing, storing and handling digital media

Once a school or educational institution has created or downloaded a number of digital media assets (including digital video assets) they will need to think about the management and storage of them. The schools involved in this project generally stored assets either on a local hard drive (or external hard drive) or on a server forming part of their computer network. While such approaches seem to be working well at the moment, the increasing number of digital video assets, most of which are large files, will soon start to affect network performance and ICT infrastructure. Digital video asset management systems are currently being commercially developed which can alleviate such problems. These systems comprise integrated hardware and software which enables commercial and self-created digital video assets to be stored on an separate fast hard disk, and accessed through a local interface or portal, which uses a database. The beauty of the system is that it allows the users to add their own metadata and mark parts of the assets for instant access.

Copyright, IPR and usability

The importance of issues surrounding copyright, access and usability cannot be over-stated, and these should be among the first to be considered when using digital media assets. The ease with which digital files can be distributed and repurposed belies the complexity in relation to copyright and usage, and some holders of digital assets are therefore reluctant to allow unrestricted access to materials which could be re-worked in ways unrelated or

detrimental to their original purpose. Concerns over wide, unauthorised distribution of materials are reflected by the high profile reactions of the recording industry to peer-to-peer file sharing networks, and many educational institutions have blocked the transmission of digital media files (in formats such as MPEG, MP3, MOV. SWF and RAM).

The blocking of sites at LEA and RBC level was observed in a number of schools during the course of the project. As well as concerns about copyright infringements, however, this may be related to the need to prevent children from accessing inappropriate content, to restrict the amount of online activity related to personal interests, and to preserve bandwidth.

The need to balance all these factors is an important consideration for schools, LEAs and RBCs. While preserving bandwidth and providing for pupils' online safety, the restriction of file types also cuts down the quality and choice of assets available to them. An MP3 file, for example, could be a talking book, or a recording of pupils speaking and presenting, or a student's musical composition. Indeed, most of the work produced during the life of this and the previous project is in digital video or music formats (such as MOV and MPEG). These issues will need to be resolved through effective communication and dialogue between schools, LEAs and the RBCs. It is also important that policy makers, including Becta, offer guidance and advice.

Appendix B: Data collection tools

Online questionnaires

Data was gathered from the key participants in the project – namely, teachers, senior management and school staff with a technical responsibility for supporting the project in school – by means of a series of online questionnaires. These were designed to provide as much contextual information as possible while not being too onerous to complete, and included drop-down menus wherever possible to speed up data entry. More detailed responses could be entered in free-text fields. All data collected is held on a FileMaker multimedia database.

One of the aims of the questionnaires was to gain baseline data which would provide a comprehensive picture of how the project was developing over time. This approach also enabled the evaluators to select a sub-sample of 12 schools for a series of initial half-day visits taking place in June 2003. The final project questionnaire was made available to schools during February 2004, and asked for detailed information about the progress, development and impact of the project.

Questionnaire for participating project teachers

Question	Field type	Field options
School name	*Text*	
Title	*Text*	
First name	*Text*	
Last name	*Text*	
Curriculum area	*Drop-down menu*	<primary all subjects> <art> <business studies> <design technology> <English> <geography> <history> <ICT> <maths> <MFL> <music> <RE> <PE> <science>
Type of school	*Drop-down menu*	<primary> <junior middle> <secondary> <special>
Have you any previous experience in using/working with photography or film?	*Drop-down menu*	<no experience> <some experience> <very experienced>
Have you any previous experience in using/working with computer graphics?	*Drop-down menu*	<no experience> <some experience> <very experienced>
Have you any previous experience in using/working with digital photography?	*Drop-down menu*	<no experience> <some experience> <very experienced>
Have you any previous experience in using/working with digital video	*Drop-down menu*	<no experience> <some experience> <very experienced>
Please provide a brief summary of your ICT experience and interests in teaching and learning	*Text*	

Question	Field type	Field options
Do you use any multimedia software? Please state which	*Text*	
If you attended the ATI course, which optional sessions did you attend?	*Multiple choice list*	<curriculum digital video> <iMovie> <advanced iMovie> <Mac OSX> <QuickTime Pro> <Live Channel Pro> <sharing movies> <animation> <digital photography> <working with sound>
What aspects of the ATI course in Cheltenham did you find most useful?	*Text*	
Please indicate any areas where you feel you need extra support advice with regard to digital video.	*Text*	
Part 2: Digital video assets		
Do you download materials from the internet for use in school?	*Drop-down menu*	<yes> <no>
Please highlight all the materials you download in – or for use in school.	*Multiple choice list*	<text> <images> <sound> <video> <virtual reality> <software>
Please indicate your experience and awareness of copyright issues	*Drop-down menu*	<none> <some> <very experienced>
Part 3: Project background		
How did you first become aware of the Teaching and Learning with Digital Video Assets Project?	*Text*	
What influenced your decision to become involved with the project?	*Text*	
What benefits do you think digital video will offer in the school?	*Text*	
What benefits do you think digital video will offer your pupils?	*Text*	
What benefits do you think digital video might bring to your teaching?	*Text*	
What do you see as the main issues for classroom management in the project?	*Text*	
How might you involve other teachers?	*Text*	

Question	Field type	Field options
How will you introduce digital video to your pupils?	*Text*	
Part 4: Project details		
Curriculum area(s) involved in project	*Text*	
Year groups/age of pupils	*Text*	
Were other teachers/staff involved in project? If so, how many?	*Text*	
Please submit a brief outline of your planned project(s) (250 words max)	*Text*	

Technical questionnaire

Question	Field type	Field options
Number of ICT rooms/suites	*Drop-down menu*	<1> <2> <3-5> <6+>
Number of departmental suites/clusters	*Drop-down menu*	<1> <2> <3-5> <6+>
Number of networked computers	*Drop-down menu*	<under 25> <26-50> <51-100> <200+>
Number of portables/laptops	*Drop-down menu*	<under 25> <26-50> <51-100> <200+>
Number of PCs	*Text*	
Number of of Macs (including digital video production)	*Text*	
Other platform used	*Drop-down menu*	<Acorn> <Linux> <Unix>
Number of above systems	*Text*	
Networking system and specification	*Text*	
Do you use wireless networking?	*Radio button*	<yes> <no>
Please provide a brief synopsis of your internet connection and access.	*Text*	
Number of interactive whiteboards	*Text*	
Number of video data projectors	*Text*	
Number of ICT teachers	*Text*	

Question	Field type	Field options
Number of ICT technical staff/managers	*Text*	
Part 2: Support required		
Internet connectivity and bandwidth	*Drop-down menu*	<need advice/support> <need occasional/advice support> <fully supported in school> <fully supported externally – RBC-LEA commercial>
Firewall and proxy (downloading issues)	*Drop-down menu*	(As above)
Cross-platform issues (Mac and PC)	*Drop-down menu*	(As above)
Plug-ins and new media technologies (eg, (QuickTime and Shockwave)	*Drop-down menu*	(As above)
Digital video technologies	*Drop-down menu*	(As above)
Media and digital video assets storage	*Drop-down menu*	(As above)
Sharing and accessing pupil work	*Drop-down menu*	(As above)

Senior management questionnaire

Question	Field type	Field options
School name	*Text*	
Address	*Text*	
Postcode	*Text*	
Tel	*Text*	
Email	*Text*	
Type of school	*Drop-down menu*	<primary> <junior> <middle> <secondary> <special>
Number of pupils on roll	*Text*	
Number of staff	*Text*	
Location	*Drop-down menu*	<urban> <suburban> <rural>
Other school information (eg, specialist school, involved in other projects, special circumstances)	Text	
Position	Text	
How did school become aware of the digital video pilot project?	Text	
What prompted your decision to become involved in the project?	Text	

Question	Field type	Field options
What do you see as the benefits of digital video for the school?	Text	
What do you see as the benefits of digital video for your pupils?	Text	
What do you see as the key management issues for digital video in school	Text	

Part 2: Project

End of project questionnaire (Project Lead Teacher)

Question	Field type	Field options
School	*Text*	
Name	*Text*	
Curriculum area	*Drop down*	<primary all subjects> <art> <business studies> <design technology> <English> <geography> <history> <ICT> <maths> <MFL> <music> <RE> <PE> <science>
Project background		
Which of the categories opposite best describes the filmed resource or asset that you have created? (Please check all that apply)	*Check box + text for comments*	<animation> documentary> <story/narrative> <other>
Which key stages have been involved in the project? (Please tick all that apply)	*Check box*	<1> <2> <3> <4> <post-16>
How many classes have been involved in making films/assets?	*Text*	
Approximately how many pupils have been involved in the making of films/assets?	*Text*	
Which subject areas have been involved? *Hold down CTRL key (PC) or Apple Key (Mac) to make multiple selections*	*Multiple choice list*	<primary all subjects> <art> <business studies> <design technology> <English> <geography> <history> <ICT> <maths> <MFL> <music> <RE> <PE> <science>
Please provide a brief outline of the key themes and topics covered in the project	*Text*	

Question	Field type	Field options
Impact on teaching		
How are you using the digital video asset in teaching? (Please check all that apply)	*Check box*	<lesson starter> <during/throughout lesson> <end of lesson> <I do not use assist in lessons>
Which type of asset have you used? (Please check all that apply)	*Check box*	<picture> <video> <sound> <other>
Was the asset: (Please check all that apply)	*Check box*	<created in school by the teacher?> <created in school by the pupils?> downloaded from the project portal?> <downloaded from elsewhere?>
How did you use the asset? (Please provide a brief description of lesson or activity)	*Text*	
Do you feel the use of the asset(s) have improved the quality of the lesson and learning opportunities?	*Text*	
Has the use of digital video asset(s) changed your approach to any of the following? (Please add any comments that you feel are relevant)	*Check box + text for notes and comments*	<classroom organisation> <classroom delivery> <lesson content> <lesson delivery>
Does the use of digital video / digital video assets require:	*Radio buttons*	<more time in preparation and planning?> <less time in preparation and planning?> <same time in preparation and planning?>
Did any technical issues arise in classroom use? If yes please outline briefly	*Radio buttons + text box for comments*	<yes> <no>
If you have not used the digital video assets yet for teaching, please tick the boxes which explain this best. (You may tick more than one box; if other, please outline briefly)	*Check box + text box for comments*	<I do not plan to use digital video assets> <I have not yet explored the digital video asset> <I have not found any suitable digital video assets> <I have encountered technical problems with assets> <I have encountered classroom management problems using the assets> <other>

Question	Field type	Field options
Impact on learning		
Do you feel that the use of digital video assets has a positive effect on pupils understanding of a subject, topic or idea? (Please add any comments that you feel are relevant)	*Radio buttons + text box for comments*	<yes> <no> <not sure>
Do you feel that the use of digital video Assets has a positive effect on pupils' literacy and communication skills? (Please add any comments that you feel are relevant)	*Radio buttons + text box for comments*	<yes> <no> <not sure>
Do you feel that the use of digital video assets has a positive impact on pupils attainment in the subject/lesson?	*Radio buttons*	<yes> <no> <not sure>
If you have ticked yes to the previous question, please indicate below which of these factors might help explain this. (Please add any comments that you feel are relevant)	*Check box + text for comments*	<digital video assets enabled pupils to understand the ideas more clearly> <digital video assets explained the topic in a way which was not possible otherwise> <digital video assets enabled pupils to focus more effectively on the topic and therefore achieve more> <other>
Do you feel the use of digital video assets have a positive impact on the standard/quality of pupils presentation? (Please add any comments that you feel are relevant)	*Radio buttons + text box for comments*	<yes> <no> <not sure>
Impact on pupils' social and interpersonal skills		
Have you noticed any gains in any of the following areas when you are using digital video assets? (Please add any comments that you feel are relevant)	*Check box + text box for comments*	<pupils are more attentive to lesson> <pupils remain on task> <pupils are able to work in groups> <pupils are able to relate to peers> <pupils are able to contribute to a lesson> <pupils are able to help other pupils>

Question	Field type	Field options
Portal and use of digital video assets		
If you have not yet used the portal or used it in a limited way, please answer the questions opposite. (Please add any comments that you feel are relevant)	*Check box + text box for comments*	<I have not been able to find the time to explore the content of the portal> <Technical problems in school have prevented me from using the portal> <Technical problems outside of the school have prevented me from using the portal <The portal was not easy to search or navigate> <I feel I need more training and support to help me understand how to use the portal more effectively> <I was not able to find any suitable digital video assets for my subject /area on the portal> <other>
Have any technical issues arisen in managing the resource in school?	*Radio buttons + text box for comments*	<yes> <no>
Training and support		
How confident do you feel when: (please score 1– 5) 1=not confident; 5=very confident		
using the project equipment and resources?	*Drop-down menu*	<1> <2> <3> <4> <5>
using Apple Macintosh?	*Drop-down menu*	<1> <2> <3> <4> <5>
filming and digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
searching for digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
downloading digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
teaching with digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
creating digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
helping pupils create digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
uploading digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
How confident are pupils with: (please score 1– 5) 1=not confident; 5=very confident		
using the project equipment and resources?	*Drop-down menu*	<1> <2> <3> <4> <5>
using Apple Macintosh?	*Drop-down menu*	<1> <2> <3> <4> <5>
filming and digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
creating digital video assets?	*Drop-down menu*	<1> <2> <3> <4> <5>
How well do you feel senior management has supported the project?	*Radio buttons*	<fully> <partially> <I have managed the project on my own>

Question	Field type	Field options
After the project		
Which aspects of the project have worked well in your school? (please score 1–5) 1=unsuccessful/not used; 5=very successful		
Making films using iMovie and the Canon digital video camera	*Drop-down menu*	<1> <2> <3> <4> <5>
Finding/using assets for the digital video portal	*Drop-down menu*	<1> <2> <3> <4> <5>
Finding/using assets from other sources	*Drop-down menu*	<1> <2> <3> <4> <5>
Using digital video assets in teaching	*Drop-down menu*	<1> <2> <3> <4> <5>
Creating your own digital video assets for teaching	*Drop-down menu*	<1> <2> <3> <4> <5>
Creation of digital video assets by pupils	*Drop-down menu*	<1> <2> <3> <4> <5>
Sharing assets with others in school	*Drop-down menu*	<1> <2> <3> <4> <5>
Uploading assets to portal	*Drop-down menu*	<1> <2> <3> <4> <5>
Incorporating downloaded digital video assets into other assets	*Drop-down menu*	<1> <2> <3> <4> <5>
Do you intend to carry on using digital video/digital video assets in our teaching?	*Radio buttons*	<yes> <no> <not sure>
If the portal and the resources provided in it were to be made available beyond the life of the project, would you be likely to use it?	*Radio buttons*	<yes> <no> <not sure>
Final comments	*Text*	

Appendix C: Project training and support

Introductory training events

These events, organised and led by the Project Manager, were held at different locations within each of the RBCs. The evaluation team attended the event held at Shuttleworth in Bedfordshire. This event was arranged for the benefit of the lead teachers from each school in the project. The event consisted of:

An introduction to the language of film

The first of the presenters introduced the language of film, with example footage and exercises based on various filmed advertisements. The next presenter provided a stimulating practical session on how digital video could be used in the classroom, concluding by involving a representative sample of the audience in digital video filming activities. These sessions were judged to be extremely popular and successful in raising interest in the potential of the project for schools and set the context for the use of digital video assets.

Repurposing digital assets

The core focus of this particular project was introduced with examples from the Imperial War Museum to show the potential of using them in house for manipulation purposes. The issue of copyright was emphasised throughout these sessions, and some of the complexities of copyright and licensing were explained.

Technical issues

The second part of the day involved the course leaders, and went through setting up equipment and basic use, followed by a basic intro to the video editing software – iMovie – and the possibilities for using QuickTime Pro to repurpose DV assets. This session also included a discussion on how digital video assets might fit into different curriculum areas. This session included feedback from teachers. Teachers contributed plenty of innovative ideas including:

- investigating fractals in art
- manipulating images by using still images as starting points
- map-reading skills in and how they relate to images on film
- ICT – how did they communicate? – data handling – genealogy

As a group, delegates expressed a strong desire to get started with the project. Most had received their equipment, including the eMac, and it was suggested that the staff should familiarise themselves as much as possible with the resources before April, when they would need to start to think of potential plans and schemes of work. The subsequent four-day residential ATI course in April was intended to provide in-depth training and practical contextual experience in using the equipment.

Some delegates had previously used digital video, but for most it was a completely new experience.

ATI Course, Cheltenham April 2003

In addition to the delegates from the Teaching and Learning with Digital Video Assets Project there were approximately 100 delegates attending the ATI course, and some of these had returned from the previous year's course and had plenty of experience to bring to the

community. Groups were widely mixed in terms of ability and background. The course was advertised on the Apple UK website.

ATI was an intensely practical course with a full agenda that involved working long hours. After an initial introduction to the resources and techniques, delegates worked in groups to create their own digital video projects. The course offered delegates the opportunity to use a wide range of digital tools and techniques including:

- digital photography
- digital video
- animation
- video streaming and broadcast
- repurposing using QuickTime Pro
- audio
- Macintosh systems and software
- multimedia in the classroom.

Delegates were fully supported by 12 Apple Distinguished Educators (ADEs). The event developed its own momentum, climaxing in a lengthy (and increasingly boisterous) premiere screening of everyone's work, which included examples of most genres. Interviews with project delegates during the course and questionnaire responses clearly indicated that ATI was both inspirational and instrumental in helping them to get started and sowed the seeds for the project. This can be clearly summarised with a selection of quotations:

"*Time to gain confidence/competence in using new kit – very difficult in a busy school."*

"Working together with others, sharing ideas, was particularly helpful."

"Extending my skills with iMovie, especially with relation to using sound. Seeing and sharing others'' ideas. The opportunity to practise and reflect on use of digital video technology."

"All areas in which I took part were extremely helpful. I only wish I had been able to take part in more workshops. The experience of working with other similarly interested people and very knowledgeable ADEs was invaluable and rewarding. I particularly enjoyed working with animation in the final day project. Being able to discuss aspects of the software (and other applications) with other users and identifying possible problems, as well as successes, was very helpful. Overall, a fantastic experience (though exhausting). Thanks to all who taught and advised."

"The entire event was useful to me. I am a newcomer to junior management, and the course was an excellent way for me to develop my motivational skills. This was most evident in the Live Channel exercise and day 3 individual projects, where everyone was under pressure to perform to a deadline. I also benefited a great deal from being able to use the new equipment constantly over a period of days."

"Being subjected to the same pressures of time and output which I give to students Networking and professional conversations."

"… meeting other teachers with similar digital video experience (ie, beginners), learning from each other and – most importantly - the time to practise with the equipment."

"Working with like minded colleagues, capitalising on the wealth of experience available, the TIME to experiment and use the technology away from the classroom in readiness for taking it back into the classroom in a more focused way."

"How to develop a storyboard and stick to it when filming. Limiting oneself to smaller units for effective editing. The project work proved equally helpful, as this proved useful in planning my own projects for school."

"Mixing with other course attendees and working on seminar projects together and sharing ideas. The course tutors were also very helpful and I learnt a lot! Being made to produce what you are being taught forced you to learn properly."

Technical training

To support the project, technical training sessions were planned and held in early May 2003 at a school in Shoeburyness, Essex. Schools from within the E2BN consortium attended this event. The training session covered:

- using the E2BN portal
- access and storage and uploading of digital assets on the E2BN portal
- downloading digital assets
- filtering and firewalls
- Mac/PC compatibility and networking.

SWGfL deferred its technical training until a later date, to take advantage of the later launch of the portal.

Appendix D: Equipment provided for the Pilot

Each school was provided with the following hardware:

1 Apple eMac G4 SuperDrive
Canon 600i digital video camera
Tripod
Microphone
Portable multimedia projector

Each school was provided with the following software:

iMovie3, iPhoto, iTunes as installed on Apple eMac
School licences for QuickTime Pro
Live Channel Pro software for live video streaming

Each school was provided with the following management and storage resources:

A caching server for storing downloaded video assets. (a different specification of equipment was provided by the each of the RBCs involved.)

Appendix E: Project partners

Thanks and acknowledgement must be given to the project partners, without whom the project could not have taken place:

Commercial partners

Apple Computer UK Ltd
AT Computers Limited
British Pathé
Canon (UK) Ltd

Education partners

E2BN
SWGFL

Associate partners

Audio Network plc
Digitalbrain plc
HBS Education (Psilogica)
John Doherty
Sherston Software Limited
South West Film & Television Archive

We would also like to acknowledge the contribution made by John Davis (Media on Demand), Mike F Keating, University of Nebraska (Lincoln), Christopher Thorpe, People's Archive.

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Becta: Creativity in Digital Video Awards
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European Education Partnership: Innovations in ICT for Learning
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High Level Skills for Industry
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iCritique
http://www.icritique.net

Independent Student Media: Screening Room
http://www.ismfilms.com/flashpages/screeningroom

Informedia Digital Video Library
http://www.informedia.cs.cmu.edu

Internet Archive
http://www.archive.org

Media on Demand Ltd
http://www.mediaondemand.co.uk

MX Vision
http://www.mxvision.nl/software.html

People's Archive
http://www.peoplesarchive.com

University of Pittsburgh: Digital Video Project
http://www.education.pitt.edu/digitalvideo

ViDe (Video Development Initiative)
http://www.vide.net

VIDOS
http://www.vidos.ac.uk

The Village Voice: Other People's Property
http://www.villagevoice.com/issues/0216/stirland.php

Visual History Foundation: Survivors of the Shoah
http://www.vhf.org